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ABSTRACT

An ecological approach was used to gather data about properties of purpose, human behavior, and setting as they unfolded in classrooms. Participating were 11 elementary school districts in the Chicago Standard Metropolitan Statistical Area; districts were stratified by median family income (low, middle, high) and per pupil expenditure (low, high). Classroom transactions were analyzed by examining the activity structure and its activity segments. Activity structure within the classroom was defined as being the main tasks or types of activities in which the children and teacher participate. An activity segment was defined as a unique time block in a lesson occurring in a fixed physical setting. In the investigation, main variables of interest were segment properties and measures of student involvement in segments. Observations were made of eight students each in math and social studies classrooms within each district. Findings indicated that children's involvement in math and social studies classrooms was virtually identical. Student involvement was related to type of pacing and cognitive level of segments. A clear pattern of increasing involvement as a function of cognitive complexity was found to be present in both sets of subjects, and children's average involvement was highest when they were working cooperatively. Further, the function of a segment in the activity flow had a clear impact on student attention. (Sample instruments, coding definitions, classroom descriptions, and tables of data are appended.) (RH)

FINAL REPORT

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CLASSROOM ACTIVITY STRUCTURES IN THE FIFTH GRADE

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Chapter 1

INTRODUCTION

The field of educational research, like many of the social sciences, is lacking a solid and timely descriptive base. There are many common sense questions we are unable to answer. In my career as an educational researcher, I have come to believe in the importance of good descriptive information as a key ingredient in the analysis of educational processes and effects.

Much prior research in education has tended to take actual classroom functioning for granted. It was assumed that classroom practice would closely follow written descriptions of curricula or other specifications of instructional methods. Research by Chall (1967) on reading instruction and my own on early childhood programs (Stodolsky, 1972) provided early evidence that there is often considerable discrepancy between "ideal" methods, written curricula, or guidelines and actual classroom practice. The existence of this discrepancy spawned studies of implementation and investigations of fidelity to treatment in order to systematically document the extent to which curricula were actually being used in classrooms and to understand reasons for a lack of consistency between plans and practices (Fullan & Pomfret, 1977; Stallings, 1975; Westbury, 1978).

The first purpose of this research is to provide descriptions of classroom activity. I share the commitment of a growing number of educational researchers to the necessity for looking in classrooms and schools in order to study educational effects and to describe current educational practice. The last decade has seen many descriptive studies of instruction. The approach taken here, however, differs from most in that I have attempted to describe educational phenomena at a level which is similar to that experienced by teachers and students.

This research started with an ecological perspective from which to derive concepts and ideas for analyzing educational practices. An ecological perspective, which leads to a focus on the classroom activity structure, seems more promising than other approaches taken by educational psychologists and curriculum researchers who have studied classroom practice and events.

Two poles can be identified in prior research. One is research describing classroom process by counting discrete and molecular acts, usually of teacher behavior or teacher-student interactions. These myriad studies of teaching have documented facts about teachers' behavior in some classroom settings (particularly recitations and seatwork) but have not been successful in relating these behaviors to the achievement of educational goals (Dunkin & Biddle, 1974; Medley & Mitzel, 1963). The other extreme in educational research studies has included gross characterizations of the educational process. These "black box" studies have been directed toward demonstrating the effects of various curricular approaches (e.g. different methods of teaching reading) on student learning. While the studies are inherently concerned with educational process, they have taken the particular details of classroom activities as given and have assumed that actual educational practices are known. Since these "black box" studies have not peered into the dark, it is not surprising that they do not help those who want to better understand the connections between educational practice and learning.

An examination of much past educational research on teaching, curricular contrasts, or classroom processes thus leaves one either with a title page and little text (the black box) or with information somewhat akin to a parts catalogue for a complex piece of machinery (molecular analysis). While each offers some information, I believe the lack of success in the field is largely attributable to having used the wrong concepts and levels of analysis.

It is perhaps a sad irony that much research on teaching has consisted of detailed quantitative studies of teacher-pupil exchanges. The molecular level applied to the classroom and analyses of human interaction more generally has sought regularities where they appear difficult if not impossible to find. Most educational exchanges in classrooms can only be predicted or programmed at a fairly general level. Order arises because teachers operate with certain pedagogical principles in mind and towards certain educational goals. Similarly, in human behavior the recognition of intentionality on the part of the actors aids immeasurably in our daily interpretation and production of behavior.

It is my contention that educational phenomena, like other human behavioral exchanges, exhibit certain regularities. In order to discover and document these regularities an investigator must examine factors which are likely to shape the behaviors of the individuals involved. Since most instructional situations are goal directed and purposeful, it seems imperative to accept purpose as a key organizer of classroom behavior, structure, and arrangements. I believe a large measure of prior failures in educational research has stemmed from using discipline-based theories which ignore the unique instructional character of educational institutions.

The ecological perspective taken in this research incorporates a fairly molar view of classroom events. Some of the "givens" of the instructional situation, such as subject matter or the age of the pupils, are examined to see how they impact on classroom practice. Classroom transactions are analyzed by examining the activity structure and its activity segments.

The Ecological Approach

A desirable analysis of classroom phenomena should be consistent with the way the participants themselves would characterize their experience. Prior research has taken too molecular a view of instructional processes. The ecological approach uses a level of analysis and description more in tune with pedagogical activity.

Ecological psychology provided a generative set of ideas for this research. The orientation of this research grew out of efforts to understand the environments of human behavior in communities (Barker, 1968; Barker & Wright, 1955) and in schools (Barker & Gump, 1964; Gump, 1967) and efforts to identify aspects of behavior which are coupled with environments.

Ecological psychologists developed the concept of a behavior setting, an easily recognizable entity in the human environment. A behavior setting has a space and time boundary and a behavioral pattern associated with it. Behavior settings can be entered. For example, a behavior setting can be: a bridge club meeting, a church service, a third-grade classroom at a particular school, or a tot lot. The idea of a behavior setting is easily understood by people in our culture because we organize much of our lives around attending and participating in various behavior settings. At a general level our behavior and that of others is constrained and shaped to enact the program of a behavior setting. Thus, while we do not know who will win the bridge game, we do know generally what behaviors will take place at the bridge club and what necessary props and materials will be provided. At this very molar and general level, then, there is considerable predictability of human behavior. Knowing which behavior setting is operating allows us to predict the general shape or outline of behavioral events which will take place in it.

If all one wanted to know was the outline of human behavior in school environments, it would be a relatively simple task to apply a behavior setting analysis to our schools. While in the right direction, this concept or construct is too broad to be analytically and empirically useful without further refinement. It is a good starting point because it directs us to a concern for situations and their structures as well as the behavioral consequences of them.

Paul Gump, an ecological psychologist, has endeavored to apply the behavior setting concept to classrooms and schools. His pioneering work has proved very useful in providing concepts with which to analyse classroom structures. In 1967, Gump reported a study in which he examined six third-grade classrooms in Kansas. These classrooms were "traditional", teacher-centered environments in which observations of teacher behavior throughout the day could be used as a basis for quite accurate description of the educational environment. Gump took the third-grade classroom as a behavior setting, but wanted to develop concepts which would identify meaningful divisions of the classroom day. In his intra-setting analysis, he identified the segment or activity segment as the proper unit of study.

Gump also developed a variety of coding categories with which he characterized activity segments and related properties of segments to student attention. My research has built very directly on Gump's and I will review details of his work when appropriate.

At this juncture, the important step we need to take is the explication of the idea of an activity structure and its activity segments. These constructs are central in my research and I believe they provide a level of analysis which is both analytically useful and meaningful to teachers and students.

When one enters a classroom, note can be taken of the "things" that are going on over time. A description of an activity structure includes noting the salient aspects of the physical environment and a cataloguing of the persons who are present (teachers, teachers aides, boys and girls). An activity structure of a classroom describes the main tasks or types of activities in which the children and teacher are participating. Thus a description of a primary class might indicate that the main activities for a twenty-minute period were a reading group of eight children supervised by the teacher using a certain page in a basal reader and taking turns reading, while located at the front of the room in a circle of chairs, and a group of 18 children at their desks working in a phonics workbook writing answers to written questions about the "th" blend. This skeletal description leaves out many details which our empirical method of describing activity structures includes, but it points to the effort to characterize the various activities which are taking place in an educational environment and to know how they are structured, who is present, their duration, and their instructional purpose and format. In this example there is an activity structure which contains a reading circle in a recitation format and a seatwork format operating simultaneously.

The subparts of the activity structure as we have just characterized them are illustrations of activity segments. They are parts of the classroom activity structure which have a particular instructional format, participants, materials, behavioral expectations and goals, and space-time boundaries. A segment is defined as a unique time block in a lesson and occurs in a fixed physical setting. Segments can occur singly or simultaneously as in the example when part of a class is doing seatwork and another group is engaged in a recitation with the teacher. Segments are of varying length, and duration of an activity segment is an important property.

The similarity between a segment and the definition of a behavior setting is fairly obvious and not at all accidental. In taking the idea of a behavior setting and looking for intra-class units, Gump attempted to retain some of the main features of behavior settings. His effort, which resulted in the identification of activity segments, allowed for a fairly molar level of analysis regarding both the environment and the human behaviors associated with it.

Activity segments are highly salient and easily recognized by teachers and students as meaningful classroom units. Recent studies of teacher planning (Clark and Yinger, 1979) indicate that teachers think about instruction in terms of content, activities and pedagogical routines. This inquiry using activity segments as a focus would be easily assimilable by teachers.

In this research I have chosen to analyse activity structures and more particularly their segments as a central task. In this introductory section, I have sketched the beginnings of the rationale for this choice. I believe describing and analyzing the activity structures of classrooms will contribute to our basic descriptive knowledge of classroom practice and also to theoretical knowledge of the dynamics of classroom processes and learning.

A Brief Overview of the Empirical Research

Having introduced the key concept of our research, a short introduction to the empirical work also seems appropriate. The data base for this

research was collected in a collaboration with J. Alan Thomas. The joint endeavor included recruiting and collecting data from districts, schools, teachers, and parents as well as classroom observations. The research questions asked by each of us are separate. Thomas' grow out of his theoretical perspective as an economist (Thomas & Kemmerer, 1983) mine from the ecological perspective I sketched in the previous section.

Basically, our goal was to obtain school districts and fifth-grade classrooms in them. The districts were selected from the greater Chicago metropolitan region. Districts were selected from cells which were created to represent two levels of per pupil expenditure and three levels of family socioeconomic level. The high expenditure districts were in the upper third of expenditures as calculated for the state of Illinois, the low districts were in the bottom-third. Family SES was estimated from 1970 census data indicating median family income for the district and was adjusted by later information obtained in our specific schools regarding occupational status of the families of our subjects and their classmates. Five of the six cells actually had schools to sample; there were no low expenditure, high SES schools.

In most instances we obtained two fifth-grade classrooms within a district, usually within the same school but occasionally in two schools. In each case we attempted to study the math and social studies classes in the fifth grade as a way of watching instruction in one basic (highly skill-oriented) subject and one "enrichment" subject.

Each math and social studies class was observed for approximately three weeks. Two observers worked as a team in a classroom. One observer wrote a general description of the activity structure of the classroom while the other observer collected data about individual student's work. In each

classroom we usually had eight children who were observed individually in a time-sampling rotation procedure in order to estimate children's involvement in the on-going tasks and their use of human and material resources.

Classes were observed on consecutive days with the goal of obtaining approximately ten days of classroom observations. Intact lessons or class periods were observed and were of varying durations depending on school schedules and teachers' routines. In general the ordinary school routine was followed while our observers were present.

In outline, the main data base which I am using consists of observations in 20 math classes and 19 social studies classes from 10 districts, including the city of Chicago. There is much additional data, beyond the classroom observations, which I will occasionally use in the analysis. However, the heart of the study relies on various ways of analysing the observational materials.

Conceptual Framework

The conceptual framework which guides this research will be presented in this section. The framework is a general view of the causes and consequences of instructional forms in classrooms. The central focus of this research is on instructional forms. The framework provides a way to place this particular inquiry in a larger context.

In my analysis I assume that instructional arrangements must be viewed both as producers of outcomes and as outcomes themselves. The activity structure of a classroom encompasses classroom organization, social environment and pedagogical activities and is enacted through activity segments. Activity segments have many features but a hallmark is instructional form or format. A general depiction of the framework is presented in Figure 1.1.

MULTILEVEL EFFECTS → ACTIVITY STRUCTURE Composed of → OUTCOMES

MULTILEVEL EFFECTS	ACTIVITY STRUCTURE	OUTCOMES
Community	Composed of	Intended
School	Activity Segments with Instructional Formats	Unintended
Class		
Teacher		
Curriculum		

Figure 1.1: Conceptual Framework for Analyzing Causes and Consequences of Classroom Activity Structures

The figure shows five sources which might be studied in order to examine factors which lead to the creation of instructional forms. Community effects, school level effects, class level effects, teacher effects, and curricular constraints would all be important to consider. Clearly, the creation of an instructional setting is a multi-level phenomena -- one which might be studied with a variety of perspectives.

Once instructional arrangements are operating they lead to both intended and unintended consequences encompassing learning as well as attitudes, values and social perceptions. A more detailed discussion of the ways in which instructional arrangements may lead to these planned and unplanned outcomes is presented in the section of this chapter, <u>The Meaning of Learning</u>. Now I will more fully discuss some of the factors which are postulated as causes of instructional arrangements.

Causes of Instructional Arrangements

It would take us way beyond the limits of this research to extensively review the myriad factors which have been identified as correlates of variation in classroom practices. A brief overview, however, seems useful for

orientation. More detail relative to variables of particular importance in this research will also be provided.

Forces which may influence the creation and use of instructional arrangements include the social and economic features of the district or community in which a school is situated. My colleagues on the larger research project, Thomas and Kemmerer (1983), have examined in detail relationships between the home and the school in the allocation of educational resources. They have also examined the role of district expenditure levels and the social status of the district in which a particular school is located in shaping instruction at the classroom level.

Thomas and Kemmerer (1983) have found that macro-level forces, such as resource allocation decisions made at the district level, do have an impact on the conduct of instruction. Similarly, using educational and occupational level of parents as indicators of status, they found some systematic variation in instructional practices and course offerings by socio-economic status. For example, higher status districts (schools) tended to offer broader curriculum, including such subjects as music and art. Within mathematics, more individualized instruction and instruction using less than the whole class was found in higher SES districts. This type of instructional differentiation also was associated with physical and material resources in the schools, such as more books and textbooks and more square feet per pupil. No one feature, such as socioeconomic status of the district or expenditure level, is sufficient to predict instructional practices in a given classroom. But school and community level factors certainly have some influence and serve as constraints on the conduct of instruction.

Parental preferences regarding education may be another influence on instructional practice. Thomas and Kemmerer (1983) and Wimpelberg (1981)

examined parental preferences in the interviews conducted with parents of the children observed in our study. Parental preferences, values and aspirations for their children's education are thought to influence behavior in a variety of ways. For some parents, locating their residence will be influenced by the educational opportunities afforded in particular neighborhoods. Parents with stronger concerns for a particular type of education will be more likely to self-select into a district with such opportunities (Wimpelberg, 1981).

Wimpelberg (1981) found that parents with more years of education were somewhat better informed about school practices. More highly-educated parents expressed preferences for smaller group instruction, particularly for their high or low ability children. Less well-educated parents preferred small group instruction only when they had a high ability child. Thomas and Kemmerer (1983) noted that parents with more education tended to want schools to include a wide variety of curricular offerings such as music, art, and foreign languages.

Swings of public concern about educational issues can impact on activities in classrooms. Sometimes public concern is translated into legislated mandates or incorporated into district policy through school board action. A recent example is the "back to basics" movement which has resulted in over 30 states adopting some form of minimum competency testing laws (Pipho, 1977). Another example is that career education is now required for elementary school children in districts in Illinois.

Ferguson (in process) has shown that schools vary in the extent to which teachers are given responsibility for curricular decisions, student placement and grouping, and teacher assignments. She found that schools located in high SES communities were more likely to permit teachers freedom

in deciding on instructional and grouping policies. She postulates that this discretion given to teachers will be used to make teaching more efficient. In any case, school philosophy about the conduct of instruction can impact on classroom practices both directly and indirectly.

An example of a school level decision which may constrain instruction is time allocation. Schools in which fixed time periods are allocated for instruction in a given subject may provide less flexibility for a teacher than schools in which scheduling is not so constrained. On the other hand, schools with fixed time schedules may insure that certain subjects are taught more regularly than those in which the teacher is freer to select curricular material. Time allocation is a good example of a multi-level variable. Time may be allocated for instruction at the school level, but then teachers still use time within the limits imposed in different ways. In addition, students make decisions about their involvement and work rate within the classroom. It is just such issues that Thomas and Kemmerer (1983) have tried to examine.

Class composition is partly determined by tracking decisions which may be made at the school level. The composition of a classroom fixes the student diversity with which a teacher must work toward achieving educational outcomes. Barr and Dreeben (1980) have shown that ability distributions in first-grade classes are related to decisions teachers make about the creation of instructional reading groups. The number of children a teacher teaches, their ability distribution, and curricular expectations and objectives all impact on instructional decisions about the utilization of time, space and materials in pursuing educational results.

Teachers own preferences, values and past experiences are also important influences on the creation of the classroom activity structure. In-depth

investigation of teachers' assumptions about teaching are relatively recent. Bussis, Chittenden and Amarel (1976) conducted an interview study of teachers who were involved in open education programs in order to better understand their perspectives on instruction. Plihal (1982) examined the intrinsic rewards teachers expressed about teaching and preferences for teaching varying subject matter. Plihal found an association between student involvement in teachers' classrooms and teachers' reward orientations and preferences. Shavelson and Stern (1981) provide a review of studies on teachers' pedagogical thoughts. Their review indicates that some progress has been made in studying teachers' decisions and planning behavior, but that more knowledge is required about the relationships among teachers' thought and teaching behaviors. It is clear, however, that a connection does exist between the way teachers think about teaching and how they actually teach in classrooms.

One element which enters into teachers' decisions about instructional practices is their past experience. If we return to Figure 1.1, a full circle could be drawn among the elements in the diagram. A teacher who has tried a particular instructional arrangement, for example, the use of small peer work groups, will make some assessment about the success of that instructional approach. The teacher may experience the arrangement as successful or unsuccessful in terms of student learning or attitudes, may see the arrangement as demanding too much work or preparation, may see it as useful for some children but not others, may find that colleagues object to the noise level created, etc. Such considerations will raise or lower the probability that the teacher would use a given instructional arrangement on another occasion. It will also contribute to her/his conception of that instructional approach and its applicability or desirability.

Another way in which past experiences enter into decisions about instructional arrangements is in the actual repertoire of skills and abilities the teacher has mastered. Knowing how to do certain tasks and not others will limit the teacher when selecting an instructional form and instructional content.

In this research, I have paid particular attention to the nature of the subject matter as a determinant of classroom instructional arrangements. There are many ways one can think about the impact of subject matter on classroom teaching. The importance or priority assigned to a subject by the school, in the evaluative system, by an individual teacher or by pupils may affect the conduct of instruction. At the elementary level distinctions between "basic" and "enrichment" subjects or "skills" and "frills" have been made for a long time. Proponents of an integrated approach to instruction try to break down these distinctions by arguing such compartmentalization of knowledge is inappropriate.

There is, however, a logic to the argument that some subjects are more basic. Reading seems essential because it is prerequisite to learning in other fields. Even if one argues against a basic/enrichment dichotomy, differences in instruction in these areas have been documented. Time allocations are greater to the basic subjects than to the enrichment subjects in the elementary school (Fey, 1979; Rosenshine, 1980; Sirotnik, 1983).

Priority and grade level taken together lead to a pattern of time allocations to subjects which changes over the elementary grades. Reading and language arts activities receive the most attention in the primary grades. Math ranks in second place (Weiss, 1978). Other subjects such as social studies or science are taught very infrequently or not at all in the first years of school.

Time allocation is not the only indicator of priority of subject matter. Differentiation of instruction and attention to individual progress in the skill areas is another indicator of the importance of the subject. In the primary grades, teacher-led reading groups are almost pervasive. Groups are created to provide closer supervision of students who are novice readers and to deal with individual differences in learning. Whole class instruction in reading is rare. On the other hand, math instruction may more frequently be taught to the whole class and more uniform expectations for students may be held. Grouping does occur in math classes in the early grades, but it is not as consistently present as in reading. These differences both in time allocation and instructional form reflect constraints on teachers' and pupils' time and resources as well as management concerns. Teachers working with small groups consistently face the problem of how to appropriately occupy the rest of the class while providing only minimal supervision. Such arrangements can only be viable with young children for a portion of instructional time.

In the upper elementary grades, time allocations to subjects shifts somewhat. Reading instruction still commands the most time but time in math increases. Weiss (1978) reports approximately one and a half hours are spent daily in reading instruction in K-3, and this figure drops to about one hour in grades 4-6. Small increases in the amount of time spent in social studies and science occur in the upper grades. What these figures show is that some teachers will begin to allocate time to science and social studies in the upper grades, while others still do not. It would not be unusual for a child to complete the first six grades of school with little if any instruction in science, social studies and other enrichment areas.

Another way in which priority of subject can be expressed is in the timing of instruction. I have observed that it is much more likely for a basic subject to be taught in the morning than in the afternoon or near the end of the day. It is assumed that children have the most energy for learning in the morning and the most important subjects are placed there.

The nature of the discipline or subject matter area is a possible source of influence on the way instruction is conducted in the field, but this is a very complex issue. There have been curriculum reform efforts which have tried to incorporate a discipline-based perspective into school instruction. For example, modern math was influenced by psychologists and mathematicians. Mathematicians urged teaching materials which would reflect the structure of common mathematical systems. Developmental theorists suggested changes in instructional techniques and materials that would be more appropriate for children at given stages.

Some features of the disciplines are surely important. Mathematics as a structured, sequential subject area lends itself to forms of instruction which may be much more difficult to use in less structured fields. For example, programmed instruction or individualized instruction programs in which children work through a sequential set of goals seem more practical and appropriate in mathematics than in a course in the humanities.

The lack of sequence and the broad range of disciplines which are included in social studies, has made curriculum development particularly difficult. Ellis (1981) notes:

> Perhaps no other area of the elementary school curriculum poses a greater problem to those who develop curriculum than social studies....In what order should students study certain groups of people? Should people and countries be studied chronologically? Regionally? In mathematics, most would agree that addition precedes division as a learning experience. But does Mexico precede Canada? (pp. 24-25).

The goals and cognitive processes also may vary from one subject field to another. In the elementary grades, mathematics instruction is usually limited to arithmetic computational skills. While math educators may be proponents of problem solving and analysis, most instruction seems geared to algorithmic learning (Bell, M. & Bell, J., 1983; Fey, 1979; Stake & Easley, 1978).

In a field like social studies, more diversity of objectives obtains. Inquiry, research skills, interpersonal problem solving, values clarification and knowledge may all be included (Ellis, 1981; Orlandi, 1971). To the extent that different goals involve different instructional means, teachers will tend to arrange educational environments as a function of the goals. The relationship between educational goals and arrangements is not well established or understood, but it seems worthy of investigation.

Psychologists seem increasingly willing to accept the idea that mental processes do not transfer broadly from one field or problem context to another. Shulman (1974) started his studies of medical diagnosis and clinical work believing that doctors would provide an example of diagnostic and problem solving skills that would be general. He concluded that the processes he studied were subject specific. The classic study by Thorndike (1924) addressed the value of studying Latin for developing thinking ability and mental discipline. He concluded:

> "By any reasonable interpretation of the results, the intellectual values of studies should be determined largely by the special information, habits, interests, attitudes, and ideals which they demonstrably produce."(p. 98).

Recent work in cognitive psychology seems to support a view of learning as fairly context-specific. Here I argue that teaching and educating may also be quite specific.

There are traditions of teaching in subject areas which seem to be transmitted sometimes quite unconsciously to neophytes. This is a topic which bears much more discussion than can be provided here, but an indication of some of the differences is warranted. Looking at textbooks used in teacher training methods courses is one way of discovering what kinds of assumptions may pervade teaching in a particular field. Teacher manuals provided with student texts are another good source.

As an example, math and social studies methods books seem to make quite dissimilar assumptions about conditions of teaching and learning and about instructional goals. Similarly, teacher's manuals accompanying textbooks have differing emphases. In discussions of teaching math, concern for the progress of individual students is evident. It is usually expected that the teacher will present concepts and develop ideas with the whole class. Following the development phase of the lesson, children will be provided opportunity for practice and evaluation of progress will be made. Individualization is the main thrust of efforts to improve instruction (Travers, Pikaart, Suydam, and Runion, 1977).

In social studies (Ellis, 1981) a variety of classroom procedures are suggested which do not appear in math methods books. For example, the use of small groups is often suggested as a major component of the social studies teaching program. Small groups are rarely mentioned in math texts or methods books except in the form of ability groups with which the teacher works (a form of individualization) or in connection with tutorial programs which have occasionally been recommended. In contrast, small groups in social studies are often an integral part of teaching and involve the completion of tasks which require discussion and joint effort.

Suggestions for student reports, field trips and library research also appear in social studies texts. Such pedagogical devices are not usually suggested for math classes. On the other hand, careful monitoring of individual progress and provision of class time for practice are not emphasized in social studies.

Much more investigation of possible sources for subject matter differences in instruction is needed. The research to be reported will provide some empirical verification of subject matter differences in the actual conduct of instruction. What seems important at this stage is that practitioners probably have different conceptions of how to teach varying subjects. These conceptions probably arise from their own experiences as students in various disciplines, from their training by subject specialists, and from the nature of the actual subject they are teaching.

Clcsely related to subject matter considerations are the material resources which are available in an instructional setting. Both the types of materials and the quantity and quality of them will affect the teacher's ability to conduct instruction. Where resources are scarce, it is likely that instructional options may be quite limited. On the other hand, plentiful resources can facilitate instruction if teacher preferences and goals are facilitated by the material resources. Materials on the shelf are not guaranteed use in classrooms. My colleagues, Thomas and Kemmerer (1983) have examined some aspects of resource allocation in regard to materials and space provided for teaching.

Last, the grade level and developmental status of children has a major impact on instructional procedures. Teachers must consider the psychological and developmental appropriateness of activities. Lengths of instructional periods, reliance on the written word as opposed to speaking

or direct action, and other features of instruction may vary with the grade level being taught. As noted earlier, curricular demands and priorities also shift from grade to grade.

In this section, I have tried to provide an overview of some factors believed to impact on the conduct of classroom instruction. Forces which may influence the creation of particular activity structures have been discussed. A detailed listing of these factors is contained in Figure 1.2, which might be examined as a way of recapitulating the material to this point.

MULTILEVEL EFFECTS →	ACTIVITY SEGMENT FEATURES →	OUTCOMES
Community Context (SES)	Instructional Format	Involvement
Parental Preferences	Pacing	Achievements
School Philosophy	Cognitive Level	Attitudes
Tracking Decisions	Student Behavior Pattern	Values
Time Allocations	Teacher Leadership Pattern	Interests
Resources Available	Group Quality	Friendship Patterns
Physical Environment	Options	Conceptions of Learning
Class Size	Student Interaction	Task Familiarity (Potential for Transfer)
Ability Distribution	Feedback	Communication Skills
Teacher Values	Student Location	Perceptions of Success/Failure
Teacher Preferences	Materials In Use	
Teacher Past Experiences		
Subject Matter		
Curricular Topics		
Materials Available		
Grade Level		

Figure 1.2: Detailed Conceptual Framework

Some of the factors contained in the conceptual framework have been explicitly investigated in the research on classroom activity structures. Many have not been studied in our research, yet they must be kept in mind when interpreting data and results.

The Activity Structure

I have already introduced the idea of the activity structure and its component activity segments. Additional information will be provided in this section in order to further understanding of prior research on activity segments and the reasons I chose these units as the focus of study.

The primary conceptual appeal of activity segments is their salience and congruity with the way teachers think about the conduct of lessons. The failure of much research on teaching which used molecular analyses of teacher-student interactions led me to seek a level of analysis more in keeping with instructional purposes.

Most observational research has used some unit of time as a means of sampling and analyzing behavior. But time is not the basis on which most behavior is emitted. Consequently behavioral units studied from equal time intervals have the advantageous property of being comparable, but the disadvantage of being arbitrary. Time-sampled units of behavior are comparable in that an equal opportunity for the exhibition of the behavior has been provided and observations can be compared using time as the base. However, time sampling may lead to counts of behavior which do not reflect the behavioral units as they would be observed without regard to time. The match between a unit of behavior from a fixed time interval and the duration of an actual behavior or instructional arrangement may be quite imperfect. Time-sampled units are equivalent with regard to time but not usually equivalent with respect to other important factors that may shape behavioral occurences.

Choice of sampling unit is a particularly acute problem in classroom research. If one is interested in studying instruction through a period such as a lesson, capturing the major divisions of instructional activity

as they unfold is important. Using activity segments permits analysis of instructional arrangements with varying durations rather than locking into a system which is strictly time-driven. While activity structure analysis contains information about time in segments, segments vary in their durations. Two recitation segments of differing lengths may be very similar from an instructional point of view.

Gump (1982) has recently commented on some positive features of activity segment analysis. "The use of a segment framework provides a structured vision of a classroom in operation. Crucial aspects of this operation can be systematically considered, perhaps manipulated." (p. 113). As intact lesson parts, segments offer a very useful and cogent portrayal of classroom activities.

Having settled on activity segments as a basic unit of analysis, what features of segments should be studied? Prior research, particularly by Gump (1967) and Grannis (1978) suggested some important aspects of segments. In addition, my own experience in classroom research and the observations we collected suggested relevant segment features.

As a starting point, I developed a very general characterization of segments in terms of instructional format. Formats are categories of well-known instructional arrangements. For instance, recitation, seatwork, groupwork, demonstration and student reports are all examples of formats. There is some inexactness in format designation -- not every aspect of two segments with the same format is identical -- but the overall action pattern and roles are the same. Format seemed useful because it is familar and global. Methodologically, it allowed investigation of whether more fine-grained coding of segments would provide better information than a global rendering.

Gump (1967) developed coding systems for a variety of features of segments he studied in traditional third-grade classrooms. He also examined the relationship between student involvement and segment features. A central variable he identified was pacing -- an indication of who was establishing the rate of work, essentially who was running the segment. Children working on their own as in a seatwork setting would be in a self- or child-paced situation, while a recitation would be a teacher- or externally-paced segment. Gump also coded the type of group found in the segment according to whether the whole class or a subset were included and whether children were expected to be independent or interdependent.

Grannis (1978) used behavior stream records of individual children in second-grade Follow Through classes in order to study setting properties. Grannis and Jackson (1973) also identified pacing (later called press) as a pivotal variable in their analysis. Grannis developed the idea of congruence or fit among certain aspects of the knowledge order and the social order of classrooms. The central hypothesis was that students are more involved in learning when setting features are well meshed than under incongruent conditions. Grannis' small data base supported the idea that congruent learning conditions are associated with higher involvement of children. Congruence was defined in terms of the consistency of segment features with the pacing variable.

According to Grannis (1978), a congruent setting could be identified by examining three or four key variables. In his published analysis he looked at pacing, options, feedback, and learner-learner interaction. An example of a congruent child-paced setting was a case in which children chose their activity (options), had materials such as manipulatives which provided feedback or correction (feedback), and were allowed to use other children as sources of help (learner-learner interaction). Seatwork settings are often

incongruent because children do not choose activities or have access to feedback. Frequently interaction among children is not allowed during seatwork. Grannis provides some interesting insight into why seatwork settings are often found to have low student involvement levels. Grannis' ideas were consistent with the Gump data as well as his own. The ideas seem to have considerable heuristic value and suggest some possibly general propositions about settings that would be worth examining. Yet a limitation is that only young children were included in both these studies.

In choosing variables to code for segment analysis, I incorporated ones which had been examined by Gump and Grannis. I also created some new variables and coding systems for them. Figure 1.2 contains a list of the major features of segments which were included.

Whether children were given activity options and the nature of those options was coded. The extent of interaction among students was also examined. Feedback was coded, particularly in child-paced segments where it might be important in supporting ongoing learning and motivation to learn. A code for group quality was also used. I directly borrowed from Gump a coding system for teacher leadership pattern which indicated what kind of role the teacher played in the segment. Teacher leadership pattern turned out to be quite redundant with format, and is usually easily inferred by knowing format.

While the Gump and Grannis coding schemes were useful, modifications were necessary because of the change in grade level and subject matter in our study and to capture certain features not of interest in the earlier studies. Nevertheless, substantial help was provided by having the prior studies.

A limitation of the earlier research was that little attention had been paid to the nature of the intellectual activities in the settings or

to the specifics of subject matter. Since a major purpose of the activity structure analysis was to capture instructional transactions, it seemed essential to characterize the intellectual processes in the segments. An approach to this was coding the level of the cognitive goal of each segment. A modification of the categories in the Taxonomy of Educational Objectives was used for this purpose. I believe that cognitive goals are a key feature of segments and that analysis of instructional arrangements must consider the type of intellectual process that is being sought. It would be inappropriate to assume that a given instructional arrangement would be equally suitable for the achievement of all intellectual outcomes. By coding the cognitive level of segments, it becomes possible to examine this issue more systematically.

Student behavior codes were also developed, primarily on an inductive basis. Here we wanted slightly more specific descriptions of how children were spending their time in segments. Specific action patterns were coded. For example, children answering oral questions, children solving problems at their desks, or children watching films were student behavior codes.

Since classroom environments are physical milieus, and my colleagues, Thomas and Kemmerer (1983) were particularly interested in the use of resources, some variables dealing with resources and space seemed relevant. In particular, we developed a coding of student location in order to get an idea of where students worked during segments. In addition the types of materials students used (textbook, workbook, manipulative, etc.) were coded.

In examining coded features of activity segments, two major purposes are served. The first is to provide a rich description of what is actually seen in classrooms in a somewhat economical fashion. The coding of segment features permits considerable detail when desired, but is more manageable than reading through the narrative records from which the coding is derived.

The second purpose in looking at activity segment features is to study relationships between student involvement and these variables. To the extent that relationships are found, a better understanding of the dynamic impact of these setting arrangements is provided.

Considered from a more general point of view, activity segment features are a means of delineating characteristics of settings which are generally under teacher control. An understanding of the possible importance of these segment features in promoting student learning and other outcomes should facilitate efforts to think about the improvement of teaching and learning.

It is presumed that some activity segment features will be more important in connection with certain student outcomes. For instance, positive student attitudes and interests may be fostered by settings which are supportive of mutual exploration and learning such as group work settings. High levels of student motivation and competition might be sustained in more individualized settings.

There tend to be relatively few setting arrangements in use when all the possible combinations are considered. An intriguing question is why certain segment features are consistently used together. What instructional and managerial problems are solved by the activity structures which are created and used by teachers?

By providing a descriptive picture of activity structures in use some progress may be made in understanding educational practice. The activity structure and its component activity segments are the focal point in our conceptual framework. The activity structure is created through the confluence of many forces discussed earlier. Once in place, activity segments become the enactment of an instructional program. Students and teachers live their classroom lives in the unfolding activity structure. The quality of school experience is largely determined by the shape of the activities.

The Meaning of Learning

The conceptual framework encompasses both causes and consequences of instructional forms in classrooms. To this point I have discussed factors which have been identified as possible causes or forces associated with the creation and maintenance of certain instructional arrangements. Instructional arrangements lead to intended and unintended consequences encompassing student learning and other effects such as the development of attitudes and social perceptions. In this section I will focus on the effects of instructional arrangements and the operating dynamics which may produce planned and unplanned outcomes.

The approach taken to understanding the intended and unintended effects of instructional arrangements builds in part on the general theory of social knowledge proposed by Berger and Luckmann (1966). I assume that the form of instruction and the settings in which children work produce knowledge about learning along with planned achievements. Children do not only learn the content of lessons. For example, if teachers always introduce new materials and concepts to children, the children may come to assume that adult explanation is a necessary part of learning in that curricular area. On the other hand, the utilization of written resources, television, or computers could produce different conceptions of the learning process, including whether a particular subject is seen as easy or hard to learn (Salomon, 1983).

Many social scientists (Dreeben, 1968; Goffman, 1959; Kluckhohn, 1961; Mead, 1934) have theorized about the impact of experiences on peoples' values and meaning systems. It is assumed that experiences, especially repetitive ones, carry both explicit and implicit meanings for the participants.

The hidden curriculum is conceived as a set of values, messages and meanings which are transmitted through the school experience although their transmission is not explicitly planned (Dreeben, 1968; Jackson, 1968). The daily interactions between teachers and children and the physical and social milieu in which they function are contexts in which much implicit learning occurs.

It is posited that daily experiences affect children through a variety of mechanisms including direct learning and rehearsal as well as less conscious mechanisms which are characteristic of many socialization experiences. Processes such as identification, modeling, and conditioning may be involved.

While operating within a given instructional and task structure, pupils learn the ways to function within the particular task or activity form. Presumably experience with recitation formats or peer group structures or tutoring facilitates future student performance in similar settings. This redirects our attention to the idea that instructional arrangements teach and socialize children in both their content and forms. Children learn to do worksheets or write essays both by learning the content of a particular assignment and how to set up a page, how to use time, what the teacher is likely to expect as a product, etc.

In reviewing studies about the use of instructional peer work groups in classrooms, it became clear that a set of skills and abilities having to do with functioning in a work group is needed by children. Often preparation in group work skills is not included in the instructional process. Without preparation less effective group work results (Stodolsky, 1983). As in many instructional situations, there are at least two aspects to successful task performance. One is knowledge about the actual content of the task and prerequisite skills and abilities. Good instructional practice usually addresses this need. The other is a set of skills (one is tempted to call

metaskills) which have to do with how to do the task qua task. Children are rarely explicitly given instruction in this domain, but do develop ideas and varying levels of skill in this area.

Different forms of activities and tasks carry with them varying prerequisite skills and abilities with regard to content and knowledge about how to proceed with a certain type of task. Greeno (1978) has illustrated such knowledge in an analysis of geometry problem solving in which he demonstrates that students must know certain patterns of solution in order to be successful and that such patterns are rarely explicitly taught.

Similarly, Tobias (1982) discusses macroprocesses which students use as they work with instructional materials. Macroprocesses include such behaviors as review, taking notes and mechanisms for averting confusion. He suggests that different instructional methods may lead students to employ differing repertoires of macroprocesses and when this is the case method differences in learning would be expected. However, if different methods lead students to essentially the same mental activities, outcome differences would probably be minimal. While Tobias' work is preliminary, it seems to contain heuristically useful ideas consistent with our own.

The type of educational arrangements children experience have apparent as well as less obvious effects which may influence their ability to perform in other learning or assessment contexts. Shapiro (1973) found that children in an informal educational program were less able to deal with the task demands of a standardized test than were traditionally-educated children, even though the content of the test was presumed within their grasp. Prior forms of educational experience and assessment had taught these children certain skills which did not transfer well into the new context. Such effects were also operating for the traditionally-educated children. The children's

expectations about their role and that of adults, their idea of what constitutes right answers, and other conceptions were all partially shaped by their history of experience in a certain type of educational environment. Similar patterns have been noted in persons trained in systems which rely on essay exams rather than multiple-choice tests (Madaus, Airasian, & Kellaghan, 1980). Experiments on learning sets (Luchins, 1942) are indicative of the same type of transfer problem.

As students learn content and ways of functioning within instructional forms, they also learn the meaning of learning as defined in their environment. Many facets of learning might be identified in an examination of the impact of task form and content on children's ideas about learning. For example, children's interest, perceptions of ease of learning, and conditions or resources thought necessary for learning might be affected by task experiences. Different activities and tasks may convey different conceptions about what it means to be an effective learner. It is of course not only the conception which may differ, but the actual task requirements. Learners may develop different skills, abilities, habits and attitudes by experiencing different types of learning environments. A concomitant of such experiences will be expectations and beliefs about different types of learning.

Subject matter differences are a central concern in this research. As will become clear, the conduct of instruction in the two subjects studied is markedly different. These variants of school experience may produce long term effects on pupils' attitudes toward learning and schooling in certain subject areas. Their conception about what it means to be an effective learner in a given subject will also vary. Of course, what is actually demanded in terms of task performance is really different in these two subject areas.

Some analysts have focussed on the messages conveyed to students in schools about good behavior, cooperation and competition, and how to get good grades. Doyle (1977) has described classrooms as settings in which children perform in exchange for grades. Doyle presumes that a major task for students is to learn how to behave and execute tasks in such a manner as to receive the grades (rewards) they desire. According to Doyle (1977), classroom task structures may be seen as the context in which performance for grade exchanges occur. In a given setting the student detects behaviors and productions which will attain rewards for him. The clarity and ease with which students may discern the behaviors that will be rewarded are important properties of classroom activity settings in Doyle's formulation.

Blumenfeld, Pintrich, Meece and Wessels (1982) have recently reviewed developmental factors and classroom influences on childrens' perceptions of their own abilities. They postulate a role for classroom context in the development of self-perceptions of ability and they discuss possible explanations for discrepancies between children's measured ability and their self-perceptions. In line with the type of analysis Doyle has illustrated, Blumenfeld et al. show that teacher messages regarding evaluation are often ambiguous and that teachers shift grounds for evaluation. For example, in assessing a piece of written work a child may be praised or marked down on grounds of neatness or spelling accuracy on one occasion and on actual content on another. Children may be unable to accurately assess their abilities and knowledge because the bas for the evaluations they receive is not clear to them. Blumenfeld et al. suggest that children's self-perceptions of ability may not accurately reflect their actual mastery of skills and knowledge, yet they may be consistent with feedback given them in the classroom environment. In considering the possible ambiguity of the information children receive regarding their performance in classes, it becomes clear that

principles derived from highly controlled settings such as laboratory experiments may not generalize to the classroom context with respect to children's development of self-perceptions and other attributions. Blumenfeld et al. underscore the importance of understanding classroom process and the effects of activities and transactions on children and their development. In particular in describing the possible misinformation which children obtain they say "...it is important to pay careful attention to the effects of task form and feedback on task-related misunderstandings of purpose and success." (page 408).

An extensive literature on possible connections between learning environment properties and different types of learning exists. The direct outcomes of instruction are not the central focus here. Obviously instructional arrangements contribute to the planned achievements of students. Academic (cognitive) learning is usually stressed, but sometimes objectives in the affective, social, moral and physical domains are sought. The fact that instruction planned for one purpose may have other consequences needs underlining here. Instructional decisions which lead to classroom practices for achieving cognitive goals may simultaneously produce certain social and other goals. Conversely, classroom activities might be planned for social goals yet also have cognitive and other consequences.

Educational researchers are beginning to document the broader impact of educational settings on children's learning, behaviors and attitudes. Bossert (1979) has shown that sociometric choices of elementary school children are affected by classroom instructional arrangements. He found that children in teacher-centered classes where whole class recitations were stressed tended to choose friends along achievement lines, conforming to the teacher hierarchy and centrality of academic achievement in the

classrooms. On the other hand, children in classes organized with small group work and self-selection of activities did not use achievement as a criterion for sociometric choices.

Cohen (1983) has also investigated social outcomes as by-products of curricular arrangements. She has shown that certain work conditions in a bilingual classroom produce patterns of peer interactions which might not otherwise occur. Status variables are less predictive of social exchanges under the pedagogical plan she investigated.

Rosenholtz and Wilson (1980) have studied the development of self-perceptions in different classroom contexts. They compared children in classrooms which were highly individualized and classrooms which worked along traditional lines. They found greater agreement among children and teachers regarding pupils' abilities in the traditional classrooms. These findings are consistent with those of Bossert regarding sociometric choices of children in traditional classrooms. The public nature of task performance and evaluation in the traditional classroom and the heavy reliance on the teacher as a source for evaluative information seems to lead to greater consensus among children about one another's abilities and other desirable characteristics than occurs in more open and more individualized programs. One would also expect differences in perceptions of ability in classes where more small group work and other cooperative activities occur, although no research is available which directly addresses this question.

Other researchers have also examined consequences stemming from differing curricular arrangements that might be attributed in part to the form of activities and tasks as well as to curricular content. Minuchin et al. (1969) conducted an extensive look at the impact of different school environments on many aspects of children's elementary school development. Horwitz (1979)

reviewed the effects of open education as an instructional form on children's achievement, self-concepts, creativity, locus of control and attitudes. A fairly consistent finding, confirmed in a meta-analysis of open education studies (Giaconia & Hedges, 1982) is that children in open environments exhibit more positive self-concepts and are more creative. The mechanism for the production of such outcomes is likely to be in the structure of activity choice and participation which occurs in open classrooms. Children may select activities, presumably following their interests and abilities, and a wider range of behavior is acceptable in the environment. Thus there are many settings in which a child could develop self-esteem rather than a relatively narrow scope which would be available in a traditional, teacher-dominated classroom.

As Blumenfeld et al. (1982) have shown, childrens' self-perceptions of ability are not always objectively accurate. That is, they do not always match actual performance or school achievement. However, in traditional environments there seems to be consensus about the relative abilities of children in the class developed through public evaluation and the fact that there is essentially one standard for such evaluations -- the teacher. While an individual child may not perceive himself as others do, in general in a traditional environment children will perceive one another similarly with regard to ability or achievement. Further, as Bossert has shown, ability will form the base for sociometric choice in those environments.

In informal classrooms and settings which operate on a highly individualized basis the evidence indicates that friendship choices do not follow ability or achievement distinctions (Bossert, 1979). Additionally, children in open environments have higher levels of self-esteem than children in traditional environments on the average. These pieces of evidence suggest

that the daily experiences of children in these different settings do give rise to differing psychic consequences for children. As indicated earlier, the different settings also produce expertise in handling tasks which differ in their requirements. Quite apart from the content of tasks, classroom arrangements in their form would seem to have consequences for children which should be more carefully investigated.

The studies and theories reviewed to this point are consistent with an argument that the activity structure children experience in classrooms has intended and unintended effects. I have tried in particular to stress the ways in which task experiences will produce perceptions of what it means to learn, how to accomplish tasks, and how to evaluate oneself and others. While existing data in these areas are scanty, the arena seems ripe for further inquiry.

In this study of classroom ecology we do not have direct knowledge of how activity structures are internalized by students or teachers. However, it seems important to examine this general question as we describe the data about the classes we studied. Since schools are a pivotal setting in which children internalize ideas about ways to learn and ideas about learning, we need to conjecture about how arrangements we can observe may influence such ideas in learners.

In the long term, it may be more important to understand how children develop certain ways of learning and approaches to new learning than to understand the specifics of what they are learning at any given time. The school and classroom share many attributes of culture, and cultural transmission of knowledge, skills, and beliefs occur there. This is both the explicit purpose of schools and an implicit agenda which affects the participants at both conscious and unconscious levels.

Descriptive data about how schools really operate is needed in order to begin to understand school effects. This study is primarily addressed to meeting the descriptive need. However, we will also attempt to ask "How is this classroom experience shaping childrens' ways of learning?" "What does it mean to be a successful or effective learner in this classroom?" "How does one learn mathematics?" "What is easy in this classroom, what is hard?" "Who is valued in this environment?" Such questions should help us think about educational arrangements, their possible consequences, and alternatives.

Before leaving this issue of how task structures shape ideas about the meaning of learning and other behaviors, it is important to recall that the ecological perspective encompasses all actors in behavior settings. The meaning of learning is not only germaine for students but for teachers as well.

While teachers have more control than students over the creation of a classroom activity structure, they are not totally autonomous. Most important however is that once a behavior setting is in operation it carries certain messages to the teacher about learning and teaching. While the teacher has more to say about the shape of things, she is also shaped by them. She may come to develop certain skills more than others and value certain types of behavior in herself and her pupils as a function of the setting in which they operate. Teachers may not be fully aware of how much the settings they function in limit or broaden their view of childrens' abilities and interests and their own view of their teaching competence.

In sum, I have tried to indicate that some of the significance which derives from studying classroom activity lies in its force in shaping behaviors, beliefs, attitudes and perceptions in children and teachers. Education

as a planned intervention is meant to affect and change its participants, but many implicit effects are just being documented. The ecological approach should facilitate our understanding of actual activity structures and the elements which may be influential in shaping conceptions of learning and other important outcomes.

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Chapter 2

RESEARCH METHODS

In this chapter, the design of the research will be presented. The population and sampling procedures will be described. The data collection procedures, including the training and supervision of project personnel, will also be detailed.

Introduction

The data base from which this research derives was collected in a collaboration with J. Alan Thomas with support from the National Institute of Education. In a serendipitous meeting of interests, Thomas and I discovered that we could be helpful to one another by collecting data together. In so doing, we have each accomodated to the interests and needs of the other, but have accomplished our individual goals in ways we believe have been enhanced by the collaboration process.

The joint endeavor was for the purpose of recruiting participating school districts, schools, teachers, and parents and for collecting data from a variety of sources: districts, schools, teachers and parents as well as classroom observations. We also worked together in training a team of observer-interviewers who conducted most of the field work. Now that we are at the stage of analysis and writing, our treatment of the data and the questions we are asking are separate.

Thomas began data collection in the academic year 1977-78, when I was not associated with the project. I joined the project in the academic year 1978-79. While the basic district sampling procedure was the same in both years and for some purposes the data can be very effectively combined, the classroom observation procedures were considerably expanded in the second

year and it is that set of data on which most of my analysis rests. In addition four high SES classrooms were observed in 1981 in order to strengthen representation in that cell. The procedures used in 1979 were followed. Classes observed in 1979 and 1981 will be called "second year" for simplicity.

Selection of School Districts

Basically, the idea was to obtain school districts and fifth-grade classrooms in them. Districts were selected from cells which were created to represent two levels of per pupil expenditure and three levels of family socioeconomic level. The high expenditure districts were in the upper-third of expenditures as calculated for the state of Illinois, the low districts were in the bottom-third. Family SES was estimated from 1970 census data indicating median family income for the district. Five of the six possible cells actually had schools to sample; there were no low expenditure, high SES schools.

The 218 elementary school districts in the Chicago Standard Metropolitan Statistical Area were stratified by median family income and per pupil expenditure. The data with respect to family income and school expenditure were obtained from a composite tape which included information from the 1970 National Center for Educational Statistics Illinois school district file and the Illinois Office of Education school finance file for 1972-73 and 1976-77 school years. On the basis of this stratification process, twenty elementary school districts were randomly selected in the course of the study.[1] The second year sample, the source of the main data

[1]For a variety of reasons, a number of districts refused to participate in the study. When a district refused to participate, a substitute district with similar characteristics was identified. In all but two cases, the substitute districts were obtained randomly.

Table 2.1

SECOND AND THIRD YEAR SAMPLE

		Median Family Income		
		Low ($12,000 or lower)	Middle ($12,000 - $15,000)	High ($15,000 or higher)
		Cell 1	Cell 2	Cell 3
Per Pupil Expenditure	Low ($1,271 and lower)	Districts = 2 Schools = 2 Classes = 7	Districts = 2 Schools = 2 Classes = 8	Districts = 0 Schools = 2 Classes = 0
		Cell 4	Cell 5	Cell 6
	High ($1,441 and higher)	Districts = 2 Schools = 2 Classes = 6	Districts = 2 Schools = 3 Classes = 8	Districts = 3 Schools = 4 Classes = 12

Table 2.2

FIRST YEAR SAMPLE

		Median Family Income		
		Low ($12,000 or lower)	Middle ($12,000 - $15,000)	High ($15,000 or higher)
Per Pupil Expenditure	Low ($1,083 and lower)	Cell 1 Districts = 1 Schools = 1 Classes = 2	Cell 2 Districts = 2 Schools = 2 Classes = 4	Cell 3 Districts = 0 Schools = 0 Classes = 0
	High ($1,229 and higher)	Cell 4 Districts = 3 Schools = 3 Classes = 6	Cell 5 Districts = 3 Schools = 3 Classes = 6	Cell 6 Districts = 1 Schools = 1 Classes = 3

base I will use, contained 11 districts. Table 2.1 contains descriptive information about the school districts included in the sample in year two. Similar information is in Table 2.2 regarding the districts studied in the first year.

Although it was hoped that the information used for sampling purposes would be highly accurate, information obtained from the districts and schools during the course of the study indicated that the socioeconomic characteristics of several schools differed from the 1970 census characteristics of the district as a whole. These schools and districts were then reassigned to their actual position in the sample relative to median income and per pupil expenditure.

Selection of Schools and Classrooms

In most instances we obtained two fifth-grade classrooms within a district, usually within the same school but occasionally in two schools. In each case we attempted to study the math and social studies classes in the fifth-grade. The decision to study math and social studies was made by Thomas as a way of watching instruction in one basic (highly skill-oriented) subject and one "enrichment" subject. For the classroom ecology research, the choice was ideal as very different objectives are promoted in the two areas.

Meetings were held with district superintendents for the purpose of identifying schools within the district whose attendance area typified the socioeconomic characteristics of the district. Once a school was selected, the principal was asked to identify fifth grade math and social studies teachers who might be willing to participate in the research. Separate meetings were then held with teachers in order to explain the project and

solicit their support and access to their classrooms. Typically separate meetings were held with the superintendent, the principal and with a group of teachers. Participation in the project was on a voluntary basis throughout. We attempted to explain the benefits of the research and engage educator's interest. In most cases principals and teachers freely chose to participate in the research, in retrospect, we believe a few cases did occur where teachers were somewhat coerced by superiors to participate. When more teachers were available and willing to participate than we needed, factors such as convenience of observation times were considered. We also attempted to eliminate any highly unusual classes such as special education classes. Otherwise, we essentially took the luck of the draw in terms of the classes and their student composition. In some schools children were taught both subjects by the same teacher and in others they were departmentalized. The distribution of the classes on this and other features will be presented later.

Selection of Project Students

After the classrooms were selected, permission slips were sent to the parents of all the children in each class. Parents were asked: a) to allow their child to be observed in one or more classes; b) to permit access to their child's scores on a standardized achievement test which would be administered as part of the project and to the child's attendance records; and c) to agree to be interviewed.

A sample of eight students were selected from the pool of students whose parents had granted permission. A random selection from the full class list was made, and children who had permission were matched to the

random list. In most cases the sample observed was reasonably random, there were a few cases in which the response rate was so poor that all or virtually all of the children with permission had to be used. This issue of sample bias will be discussed later. Whenever possible, each sample child was observed in the two subject areas for the data collection period. Occasionally a student could not be observed in both subjects because of scheduling problems.

Data Collection Procedures

Once the districts, schools, classrooms and students were selected, data were collected for the overall collaborative project at five levels -- the district level, the school level, the classroom level, the classroom activity level, and student level. While most of the ecological analysis is based on data derived from observations of classrooms and individual children, all the information collected has some usefulness to the research.

District Level Data

A thirteen item questionnaire was sent to the superintendent of each participating school district and at the same time the district financial statement and salary schedule were requested. The questionnaire was designed to standardize the reporting of certain district financial and teacher data, which tend to be computed differently in accordance with the budget format each district elects to use.

School Level Data

The principals were also asked to complete a questionnaire related to both the human and material resources available in their building. In addition, they were requested to supply the attendance records of the project students.

Classroom Level Data

Classroom data, including the number of teachers and teacher aides assigned to the class, the occupational and educational histories of the teachers and aides, the size and shape of the classroom, and the number and kind of instructional materials available for use were gathered by the observers. The principal or teacher also supplied a list of the occupations of the head of households of all the students in the classroom. While only a rough estimate of the available material resources was made in the first year, in the second and third years a detailed inventory was taken. The observers also obtained information relating to whether or not the class represented an ability track (and, if so, which track) and whether the class was self-contained or departmentalized.

In addition, mathematics and reading subtests of The Iowa Test of Basic Skills, Forms 5 & 6, were administered to all the students in each classroom in the sample and the teachers were interviewed. The teacher interview focussed on questions related to the physical arrangement of the classroom, the adequacy of classroom space, treatment of individual differences among students, perceived level of control over curricular decisions, subject area preferences, job satisfaction and expectations for the levels of schooling

the students would complete. Teacher interviews were only carried out in the second and third years of data collection (see Plihal, 1982).

Activity and Student Level Data

The observer/interviewers were trained in a two to three week period, two weeks in the first year and three weeks in the second and third years, immediately preceeding the collection of data. Two elementary schools in the vicinity of the University of Chicago permitted the trainees to observe in their fifth grade classrooms. The classrooms in these two schools were particularly well suited for training as they provided the opportunity to observe and record a wide variety of instructional approaches. After each observation session, the observers met with one of the project directors or one of the coordinators to resolve difficulties with the use of the instruments and the student behavior codes. Comparisons were also made of the records of the observers who were in the class at the same time in order to insure reliability among observers.

The trainees were also familiarized with a detailed set of specifications which explained the purpose of each item in the parent interview, as well as the type of probes which had proved effective when the interview was pre-tested. In addition each trainee conducted at least one practice interview with a parent of a child not in the project. Several large and small group sessions were held to discuss the techniques of interviewing and difficulties with particular items.

In the second and third years, each math and social studies class was observed for approximately three weeks. Two observers worked as a team in a classroom. One observer wrote a general description of the activity

structure of the classroom while the other observer collected data about individual student's work. In each classroom we usually had eight children who were observed individually in a time-sampling rotation procedure in order to estimate children's involvement in the on-going tasks and their use of human and non-human resources. Observers alternated in the two observer roles.

The observer who recorded information about the activity structure and behavior setting did so in open note narrative form which was then re-written after the observation period. Included in the records is information regarding the teacher's location, use of materials and behavior, student location and behavior, descriptions of the materials in use, pacing of the lesson, content of the lesson and information regarding duration of various activities. Maps were made of each classroom and the observer also noted the location of the children during the observation period, what was written on the blackboard and other physical information.

The second observer watched individual project children in a fixed but random order for each class period. Each pupil was watched for five seconds and then the student's behavior and task involvement was noted. Every 30 seconds a new student was observed. After two rotations of eight students each (eight minutes of observation) the observer took a one minute break and then commenced observations again.

A variety of codes including on and off task as well as the use or request for human resources was applied to the individual student behavior. The student was coded "on an academic learning task" if during the specified interval he or she appeared to be actively engaged in an activity prescribed or permitted by the teacher. He or she was coded "off task" if waiting, socializing, or daydreaming. A special code was used if the

student was engaged in academic work which the teacher would not have permitted had he or she known about it -- for instance, reading a novel during a math lesson. In addition, both on and off categories were broken down into sub-categories with related codes indicating the precise nature of the student's behavior. In an instance where the observer was not sure whether the student was "on" or "off task", a question mark was used and the behavior was described.

After an observation period observers wrote up notes and filled in details on standard activity structure forms (see Appendix). They placed each child who was individually observed in the activity segment he was participating in so that individual observations could be matched with segment information (see Appendix).

Observers' records were read and checked by project staff, including the principal investigators. Questions regarding details of activity or student behavior were asked to observers shortly after observations had been completed. A constant discussion and checking process to produce useful records took place through the data collection period.

Observers were usually present in a class for three weeks. During the first few days maps were drawn, a resource inventory taken, and children's names were learned. The first week was to serve as a period of acclimatization both for the observers and the children and teachers. During the first week, an effort was made to collect a whole day record -- actually two half day records -- which were narratives of the entire day in the classroom group. While our focus was on math and social studies, it seemed useful to have at least one set of notes relating to the full day context in which math and social studies classes occurred. The narrative whole day records were

very useful as background, often containing explanations of special class procedures and activities which preceded our observation period. These records have not been fully analyzed to date.

The main corpus of data, on which the present analysis rests, was collected in two consecutive weeks. The observers working as a team attempted to obtain ten consecutive days of observation of full math and social studies lessons in the classrooms. We collected an average of 8.8 days in math classes and 8.1 days in social studies. These observations consisted of both the activity structure descriptions and the individual student data.

In all 11 observers were used in the project during the second year. Most of them were graduate students or experienced teachers or both. In most cases parent interviews were conducted by the same observers who worked in the school, but an effort was made to match the sex and race of the parent interviewer with the parent being interviewed.

The purpose of the interview was to elicit information related to the stock of purchased resources in the home, the way in which parents elected to spend time with the project student, and the way in which the project student spent his time after school. In the second and third year a number of items relating to parental choice of household location and preferences for curricula were added. The classroom ecology project has not really made use of the interview data to this point.

Procedures for classroom observations were considerably less intensive during the first year resulting in data which is of limited utility for the classroom ecology study. One observer attempted to observe and record both the on-going activity structure and individual children's task involvement. The records contain little detail but the data can be used in some instances to confirm or disconfirm general trends such as those relating to the use of types of instructional formats.

Data Coding Procedures

A. Identifying Segments

Once the narrative activity structure material was written up, a series of coding steps were taken. The first and most critical step was dividing each activity structure into its component activity segments. I have already conceptually indicated the main features of an activity segment. Procedurally, two coders (Stodolsky and Ferguson) did all the segmentation of the records. Every activity structure was read in its entirety before any coding was done.

In order to determine the segments in an activity structure after a thorough reading of the record, the coder assessed the main activities which occurred, first separating transitions from instructional occasions. The main basis on which segments were distinguished was that membership changed, instructional format changed, physical locations were discontinuous, times were discontinuous or instructional topics or materials were discontinuous.

Agreement between the two coders was very high. Continuous discussions were held regarding any problematic cases. In most instances, segments were easily identified. Difficulties arose primarily in classes where many separate activities occurred and decisions had to be made about how to segment such cases. Similarly, if a teacher was very unclear in boundaries of activities, for example, if it was difficult to determine the beginnings and endings of transitions, some discussion was necessary and arbitrary coding decisions had to be made. Because all further coding was to be applied to the segments as the basic unit, our goal was to come to the best decision we could about the meaning of the segments and their identification. Independent reliability was not an issue, every record was examined by both

coders and agreement was reached about coding. Such a method simply means that we had to hammer out guidelines continuously and make acceptable decisions about difficult cases whenever necessary. The great bulk of the records (90 percent or so) were segmented without difficulty.

The original segmenting procedure included specifying the beginning and end time of a segment, numbering it consecutively with an ID number which included a classroom identification as part of it, tentatively naming its format, and indicating how many children were members. Project children who had been observed during the segment were also identified.

The coding sheets which contained individual student observations also had times and children's ID numbers on them. The segment ID number to which the individual observation belonged was added to these records after segments were identified.

B. Coding Segment Properties

A segment coding sheet, containing information about each segment was prepared (see Appendix). The segment coding sheet contained duration of the segment in minutes, number of persons in the setting, classroom information, and whether the segment was simultaneous. It also contained coding of 15 ecological variables and a coding of what materials were used by students and teachers during the segment. A listing of the ecological variables and coding definitions which were used is in the Appendix.

A series of definitions were developed for the ecological variables. Some included categories already defined by Gump (1967) or Grannis (1978) or modifications of prior definitions. A code book with definitions and other coding information was developed and used by segment coders.

Reliability of coding was assessed relative to the main variables to be used in the analysis. In order to check coding reliability, 20 social studies and 20 math segments were selected at random and coded by two coders independently. Overall, on 31 variables coded (ecological variables and materials codes), 92.4 percent agreement was achieved by the two coders. In social studies the overall agreement level was 91.3 while in math it was 93.4 percent.

Table 2.3 shows the percentage agreement and the distribution of variables at different levels of agreement. No variable produced less than 70 percent agreement, most were coded much more reliably. A complete list of reliability estimates for each variable is in the Appendix (Table B.1).

This estimate of coding reliability really indicates the bottom levels of reliability achieved. It should be understood that in working with narrative records of this type, records were often read and reread by numerous coders and other project personnel. If a question arose about coding at any point in the data analysis or coding procedures further consultation ensued.

Table 2.3

Percent Agreement Between Two Independent Coders on 31 Segment Variables From 20 Math and 20 Social Studies Segments

	Number of Variables	
Agreement in Percent	Social Studies	Mathematics
70	1	2
75	2	0
80	3	2
85	3	3
90	4	4
95	9	4
100	9	16

C. Coding Student Involvement

Observers coded and then briefly described student behavior on a time sampling basis in the classrooms. Another person on the research staff subsequently checked all coding done by observers looking for consistency between the noted behaviors and the codes. During training, field reliability standards were established by having two observers watch children simultaneously. Agreement levels of approximately 90% were achieved among pairs of observers.

For most analysis purposes, codes were collapsed into "on" or "off" categories. Children were considered involved or on-task when pursuing an activity which would have been deemed appropriate and task-relevant by the teacher -- the person who actually defines appropriate behavior in the educational setting. A list of codes and an example of the recording form is in the Appendix.

Basic Descriptive Information on the Observational Data

The yield from the observations in the second and third years of data collection will be briefly described here. Twenty math classes and 19 social studies classes were observed. Twenty-one different teachers from 10 districts and 13 schools participated. There were six teachers from low SES schools, nine from medium SES schools, and seven from high SES schools. Twenty-five classes were in high expenditure districts and 14 classes were in low expenditure districts.

Exactly half of the math classes were tracked. Eleven math classes were departmentalized while nine were self-contained. In social studies, eight classes were tracked and 11 were not. Eight social studies classes

were departmentalized and 11 were self-contained. In all but one math and one social studies class, departmentalization and tracking occurred together. In addition there was one self-contained social studies class that was tracked.

The math data come from 176 days of observation over 7,804 minutes. The social studies classes were observed for a total of 153 days, 6,649 minutes. The average number of days of observation in a math class was 8.8 (SD = 1.1) and in a social studies class was 8.1 (SD = 1.6). Average length of a math class period was 44.2 minutes (SD = 7.0). Average length of social studies periods was 43.2 minutes (SD = 10.2). The average number of total minutes observed in math classes was 390.2 (SD = 84.3) and 350 (SD = 121.5) in social studies classes.

After coding the data, 708 math segments and 669 social studies segments were identified. Of these, 173 were transitions and 535 were instructional math segments. Similarly, 124 were transitions and 545 were instructional segments in social studies. The average duration of instructional segments in math was 19.45 minutes (SD = 12.54) and in social studies it was 18.39 (SD = 12.23). The average duration of transition segments was 4.73 minutes (SD = 4.41) in math and 4.77 (SD = 4.44) in social studies.

References for Chapter 2

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Chapter 3

METHODOLOGICAL ISSUES

Central methodological problems in the research will be discussed in this chapter. The multilevel character of the study data was described and the rationale behind the data collection plan was presented earlier (Chapter 2). The reasons for selecting the activity segment as the basic instructional unit were also detailed (Chapter 2). The desire for qualitative depth has guided decisions about data collection and data analysis whenever possible.

I believe the activity segment is a meaningful pedagogical unit and segment properties convey useful information. Consecutive periods of instruction in classrooms were observed to provide information about teaching and learning in the same environments over a period of time. Consecutive observations of the same children and teachers enable us to learn about different children's responses to changes in the educational environment and about the extent to which teachers use different ecological arrangements across days of instruction.

While the substantive reasons for the data collection plan are clear, it has led to data which pose a number of methodological problems. If we had been collecting data with statistical convenience in mind a very different plan would have been followed. Questions about appropriate statistical procedures for analyzing the study data and about appropriate interpretation of results are major issues.

The classroom observational data is characterized by a lack of independence which leads to methodological difficulties. For example, in analyzing activity segments a variety of ecological properties such as pacing, teacher leadership pattern, format, cognitive level and student behavior patterns were coded. Each of these variables has a unique definition and behavioral

referent but they are not totally independent conceptually. For example once a segment is coded as teacher paced, only a subset of teacher leadership pattern categories could be coded. Knowing that the teacher is a recitation leader in a particular segment adds more information than knowing the segment is teacher paced, but there is a certain overlap.

The different forms of dependence and the sources of the lack of independence in the data will be discussed in the first sections of this chapter. Subsequent sections will address issues related to representativeness and generalizability, the existential fallacy and educational research, and student involvement and the lack of achievement data. Each of these topics is an important methodological concern.

I. INTERDEPENDENCE IN THE DATA

A. Multiple observations from children and classrooms

Approximately ten consecutive days of instruction in each classroom were observed and recorded for the activity segment analysis. In the social studies data, 19 classes were observed and their data pooled. In mathematics, 20 classes were observed. Figure 3.1 shows a typical collection of segments yielded from one class period of data collection in one classroom. The figure also shows how the student involvement estimates (PON) were derived for each segment by rotating observations of the eight project children. A new child was observed every 30 seconds.

Conceptually one can discern both independence and dependence in the data set for the period. In the example, segments 1 to 4 all occur in the same class period in the same physical setting with the same teacher and the same children present. For estimates of student involvement (PON) children

TIME	Observer 1: NARRATIVE ACTIVITY STRUCTURE		Observer 2: INDIVIDUAL STUDENT OBSERVATIONS
inute 1	Segment 1	Segment 2	Children 1-5 observed in continuing rotation during minutes 1 to a in segment 1. Children 6-8 observed in continuing rotation during minutes 1 to a in segment 2.
inute a	Segment 3		Children 1-8 observed in continuing rotation during minutes a to b in segment 3.
inute b	Segment 4		Children 1-8 observed in continuing rotation during minutes b to end in segment 4.
inute end			

VARIABLES DERIVED FROM OBSERVATIONS

Properties of Segments

Each segment coded for:

Format, Pacing, Teacher Leadership Pattern, Student Behavior, Cognitive Level, Feedback, Expected Interaction, Group Duality, Duration, No. of Children in Segment, etc.

PON (Student Involvement) for Each Segment

For example:

$$\text{PON for Segment 1} = \frac{\Sigma \text{ of observations coded "on" for children 1-5 during minutes 1 to a}}{\text{total observations of children 1-5 during minutes 1 to a}}$$

gure 3.1: Typical Collection of Segments and PON Estimates from a Classroom Observation Period on One Day

are repeatedly observed according to a time sampling plan. Children are observed in whatever segment they hold membership and in a number of segments over time. In the example children 1 to 5 would contribute to involvement estimates for segments 1, 3, and 4. Children 6 to 8 would contribute to involvement estimates for segments 2, 3, and 4. Going beyond the example, these same children would be observed repeatedly for the number of consecutive days of instruction which were taught in the subject to that class.

The most obvious case of interdependence in the data arises from these multiple observations of the same children. Estimates of student involvement for segments coming from a given classroom are derived from repeated observations of the same children. In looking at a relationship between a segment property and student involvement, one wants to use each segment as an instance of a particular type. For example, I have proposed that children will be more involved in segments which have more cognitive challenge than when they work on low level cognitive tasks. To examine this proposition one would pool all segments from all classes and group them according to level of cognitive activity. Once all segments were classified as to their cognitive level an analysis would be performed to see if there was a systematic relationship between cognitive level and student involvement. Typically one would use a statistical procedure such as a one-way analysis of variance to examine this relationship. But here the problem of multiple observations emerges. The fact that children are repeatedly observed in different segments leads to a lack of independence in the estimates of student involvement. That is, the same children will be represented in subsets of the PON estimates which come from their classroom.

The problem which arises from the multiple observations of children in classes might be solved by performing statistical tests at the level of

the class. In this fashion one would assess the same children's responses to changes in their instructional environment. While this solution has appeal, it can only be applied in a limited way because of a lack of curricular replications across classes. Also, considerable power is lost in moving from over 500 segments to 20 classes as the base for examining relationships.

Another form of interdependence occurs to the extent that children are participants in segments on a non-random basis and that biases are similar across classes. For example, high achievers may be placed in small groups working on "enrichment" topics in mathematics while the rest of the class members follow the set curriculum. Similarly, children who complete their work ahead of other class members may be permitted various work options including the use of resource centers or the opportunity to play games and participate in other recreational activities. Conversely children having difficulty in mastering a topic may be placed in a small group for extra teacher instruction or be tutored by children who have already learned the material. In each of these cases the children who are members of the particular segment have certain learning histories and similar decisions may be made across many classes. Consequently the children seen in certain types of segments might be more similar to one another even though they come from different classes. For example, children seen in tutoring segments might well be the high and low achievers in the class with few middle ability children in such settings.

A very different example of non-random membership in segments is present in social studies classes in which children work in small groups on projects and select their group membership. The most common non-random feature of such grouping is that children tend to sex-segregate. Consequently many

small groups seen in social studies will be all or mostly composed of either boys or girls.

It is not entirely clear what biases are introduced as a function of the non-random membership of children in segments. It is possible that certain subsets of segments might be inhabited by children who noticeably differ in ability from a cross-section of the children in the study or a class. In such instances student involvement estimates might be higher or lower as a function of the ability composition a confound which would be difficult to assess for every segment especially when our knowledge of the behavior of all children in the segment is limited.

The interdependence problems which arise from multiple observations of children and some biases in the ways that children are placed in segments have most immediate relevance to analysis and interpretation of student involvement data and relationships among student involvement and segment properties. But multiple observations are also problematic when considering analyses of segment properties.

Segments which come from the same classroom are neither entirely independent or dependent. Teachers plan instructional conditions to achieve certain objectives so it is likely that certain sequences of activity segment types will occur. Teachers also use cues from ongoing behavioral conditions and may alter ecological features partly in response to existing conditions. For example, a teacher whose class is doing a seatwork assignment might note children becoming restless and decide to move to a contest or game format. Another teacher might notice confusion on the part of children and decide to use a recitation or lecture segment in order to clarify the children's understanding of the assigned materials. Thus, sequential interdependencies of some kind may exist in segments coming from the same

classroom. A planned instructional unit lasting a number of days is likely to have a certain format structure. While segments can be identified and analyzed individually, in a classroom they do have certain relations to one another which can be considered lack of independence.

From a data analysis point of view multiple segments coming from classrooms in batches pose particular problems because of curricular variation. Different classrooms have both qualitatively different types of segments and different numbers of segments. Curricular variation leads to different sequential and temporal characteristics of segments in classes. For example, there are some math classes which follow an individualized math program on a daily basis. These classes will be observed in long individualized seatwork segments day after day. Other mathematics classes might never work according to our definition of individualized seatwork segments. Similarly in social studies some classes use group work frequently and would contribute to the pool of cooperatively paced segments, others almost always work in whole class or teacher-led formats.

The relationship between cognitive level of segments and student involvement was mentioned earlier as a question of particular interest in this research. Curricular variation leads to more high level cognitive activity in some classes than in others. In pooling segments across classes not all classes will be equally represented in each level of cognitive activity and consequently the test will not involve every class and every child at every level. When uneven contributions from classes are joined with multiple segments containing the same children from classes, certain categories may contain a number of segment instances but they may come from a few classes and thus represent multiple responses from the same children. Careful examination of the breadth of a given test of a relationship must be made in every case.

Curricular variation also leads to different numbers of segments in classes. It should be clear that certain types of instructional programs will have more segments per interval of time than others. Programs which use small group work will contain many segments whereas programs which rely on long whole class segments will have fewer per time interval.

The number of segments coded in each class also varies with the total number of minutes observed in each class. Classes in the study differ from one another in the length of time they were observed but the variation in time observed was almost always a direct function of instructional practice. Observers were almost always available to record ten consecutive days of instruction in a two-week period. When a class has above average observation time it means that the subject was taught for a longer instructional period and/or that it was taught on more of the available observation days. Variation is particularly marked in social studies which was less obligatory in the schools we observed.

Table 3.1 contains a listing of the number of instructional segments, the number of segments in which student involvement was observed (PONSEGS), the number of minutes and the number of class periods observed in each class. The number of segments contributed by each class does vary as does the amount of observation time. The correlation between total minutes observed and the number of instructional segments is .70 ($p < .0006$) in math, and .56 ($p < .01$) in social studies.

For purely descriptive purposes the fact that segments come in batches from classrooms and that there are unequal numbers from different classes is informative rather than problematic. The knowledge that frequencies, durations and occurrences of segment types and subclasses of segment features vary from class to class in the study set is precisely the descriptive

Table 3.1

Number of Instructional Segments, PON Segments, Minutes and Days Observed in Each Math and Social Studies Class

Math Classes				Social Studies Classes			
ISEGS	PONSEGS	MINUTES	PERIODS	ISEGS	PONSEGS	MINUTES	PERIODS
37	21	456	9	16	16	138	3
24	24	386	9	16	16	357	9
26	26	377	9	15	15	349	8
33	32	446	9	21	21	319	8
23	23	431	9	22	22	305	8
27	25	373	9	19	18	378	7
39	35	529	10	57	49	680	10
26	21	462	10	34	29	434	9
27	24	442	10	23	22	379	8
21	19	272	9	14	12	310	8
34	33	422	10	14	14	251	9
38	36	528	10	24	24	286	8
19	15	246	7	36	27	394	9
13	11	299	7	37	37	182	6
21	21	290	8	21	21	216	7
23	21	332	8	67	61	418	8
10	9	271	7	37	33	367	8
19	17	287	7	33	31	370	9
26	25	376	9	34	22	381	11
51	44	450	10				

information about classroom ecology we sought. While it makes certain univariate and multivariate analyses difficult because they are based on balanced experimental designs and usually assume equal numbers of dependent variables, the configuration of the data is a reflection of actual educational practice. In pooling instructional segments from classes certain generalizations can be made about a range of instructional practice in schools of the types we sampled. In comparing segment properties between subject matters pooling segments is also appropriate and does not require statistical procedures.

B. Structural features of segments: Common behavioral base at the segment level

A variety of qualitative features of segments such as pacing, teacher leadership pattern, feedback format and cognitive level have been coded for each instructional segment. The joint distributions of these variables are often of interest. For example, when segments are child paced what feedback conditions are in use? What is the distribution of cognitive levels under different pacing conditions? We plan to display tables which reveal the co-occurrences of segment features.

In analyses of the co-occurrences of segment features, consideration must be given to how the properties were coded and how they actually occur in classrooms. The common behavioral base at the segment level presents certain methodological difficulties. The central problem is in the nature of the behavioral phenomena itself and its structural properties.

Let us assume for the moment that segments did not arise from multiple observations in the same classrooms. Would it be reasonable to assume independence among qualitative features of a given segment and thereby justify

certain statistical tests of joint distributions such as chi-square or log linear analyses? Were the variables coded at the segment level independently since they derive from a common behavioral base?

The answer to these questions is not straightforward and the problem is central to much behavioral research, particularly naturalistic research. Properties of most phenomena have a "fittingness" which makes them viable as operating units. Although properties can be coded and identified as separate for analytical purposes, they are related under some rules of event or unit composition.

In his work Barker (1968) identified synomorphy as a defining property of behavior settings. He stipulated a fit between standing behavior patterns in the setting and the props and larger physical features of the setting. The human and physical aspects of the behavior setting seem to belong together or be appropriately matched. Synomorphy is not precisely defined by Barker. The interconnections one finds among aspects of behavioral units like segments cannot be precisely defined. Yet only certain patterns of properties will "make sense" so that one does not find random orderings of event properties. In our case activity segments are created to achieve instructional ends. As planned pedagogical activities only certain configurations of patterns will occur. We know that certain combinations of qualitative attributes are likely to occur together and others are unlikely to occur because the activity segment is structurally integrated and the elements coordinated.

There are some behavioral co-occurrences which one can stipulate as structural zeroes or events which cannot occur on a priori logical grounds. For example one would not expect a segment in which children were operating in a group format but no interaction was expected among them. On the other hand interactions might be expected at a low or high level depending on

other features of the task. Similarly a child-paced segment could not contain a teacher in the role of instructor. These logically excluded co-occurrences can be specified. However, there are many logically possible combinations which simply do not ever or hardly ever occur because teachers operate within a fairly narrow range of structures in classrooms. There are no a priori reasons to exclude the combinations as not possible, but they are rarely or ever seen. Conversely there are certain patterns of qualitative characteristics which occur repeatedly in segments, particularly in segments from a given subject area.

These high frequency patterns of qualitative categories are like traditions or operating conventions. Teachers seem to rely on them over and over again, perhaps with minor modifications. Because they recur they take on some predictability in an event space. But for statistical purposes they present some difficulties. The joint distributions of qualitative characteristics are often very assymetric. In itself the lopsided character of the distributions do not pose statistical difficulties. But many empty cells occur in these assymetric distributions which can not be a priori specified as empty and other cells contain extremely low frequencies. Chi-square and log linear analyses are difficult if not impossible to conduct when distributions are of this character.

In the previous section I discussed the problems associated with multiple observations from classrooms. For analyses of joint distributions of segment properties, statistical tests would assume independence of segments. While its nature is difficult to specify, some dependence among the units is present as a result of multiple segments coming from classrooms. Certain pedagogical and physical-temporal constraints prohibit complete independence of one segment from the other. Some degree of violation of assumptions of

independence of units made in connection with chi-square or log linear analyses would be introduced as a function of the multiple observations problem. One approach to solving this problem might be to use jackknife procedures. But practically speaking the more difficult problem is the character of the distributions in which many low frequency and empty cells can be anticipated. The distributional character is an essential feature of data of the type we have collected and coded and is typical of many orderly behavioral phenomena.

Methodological Conclusion. In order to learn about the qualitative features of segments we will look at variables one at a time and in certain combinations. We will display joint distributions when they help in understanding the structure of segments. However, statistical tests of degrees of association such as chi-squares will not be used. The reader will have to rely on visual inspections in order to determine how qualitative features co-occur. It is almost a given that ecological features of segments co-occur in meaningful and limited patterns. Statistical tests of independence among variables are almost superfluous. As one examines the actual data of the study, the strength of this assertion should become evident. The statistical and computational difficulties involved in applying tests to data such as these suggest they be avoided given that the general hypothesis tested is easily rejected by inspection. In some cases if categories of variables can be collapsed to create tables with few empty cells, log linear models might be usefully applied. But in so doing, assumptions of complete independence would be violated to some extent.

C. Class level membership as a variable

The problem of multiple observations from classes has been described in the preceding sections. Implicit in the discussion has been the assumption

that classes per se would differ from one another not only in their curricular practices but also in their PON estimates. In this section we explicitly address whether classes differ in average student involvement and how such differences might be explained. Also, if classes differ in average involvement what are the implications for data analysis?

A one-way analysis of variance on average involvement levels in the math classes and the social studies classes separately shows that classes differ significantly in PON in both subject areas ($F = 5.71$, $p < .0001$; $F = 6.88$, $p < .0001$). A major objective of this research is to explain how PON varies as a function of segment level characteristics. Much of the class to class variation is assumed to arise from curricular practices and the structure of segments. However other factors may also be associated with class differences in PON and it is important to check some of these possible relations.

In selecting a sample the SES of the community and the expenditure level of the school district were used. Do these district level variables relate to student involvement in classes? Correlations among SES and mean student involvement across classes show no significant association between student attention levels in classes and the socioeconomic status of the community in which the class is located. Similarly expenditure levels are not associated with average involvement in classes. The sampling variables do not seem to pose an interpretive problem in examining segment level data.

Variables at other levels of analysis may be related to average class involvement rates. For example, it may be that teachers' management skills and planning abilities affect children's involvement in classroom activities. Sequencing of segments and teacher skill in transition periods might affect student involvement. Policies at the school level with regard to teacher participation in textbook selection, curricular decision making and tracking

of students might affect student involvement. Ferguson (in preparation) is studying some of these school level effects with our data. Plihal (1982) has also made use of some of our data in a study of teachers' rewards in teaching and has found a relationship between student involvement in social studies classes and teachers' enjoyment in teaching the subject. Plihal and Stodolsky (in preparation) are examining relations between teachers' preference for teaching the subject matter and classroom ecology.

Most systematic variation in natural phenomena can be explained in more than one way. The choice of level of analysis sets the arena in which one attempts to explain variation most parsimoniously. Educational systems like other human institutions are multi-level phenomena. In this study I am using the segment level for most analyses, but since the segments arise from classes, class to class variation is important. Decisions about levels of analysis must be made with care in educational research (Cronbach, 1976; Burstein, 1980).

I chose to consider class by class variation in student involvement as a "class membership" variable rather than attempting to account for it here. Knowing that variation does exist across classes can be helpful for certain analytic purposes. In some analyses we can ask if across class variation holds when other features are examined. For example, if one looks at all segments from all classes with a particular cognitive goal, does class by class variation in student involvement still persist? If class by class variation is diminished under certain conditions, the power of certain segment properties is revealed. In other words if sorting segments by a given property eliminates the effect of class membership on PON, the property reduces variation in student response or conversely produces noticeably more homogeneous student response. The strategy of identifying variables which

behave this way is another method for looking at the impact of segment features on student attention.

Summary and Conclusions

Multiple observations from classes and repeated observations of children in their classroom environments are the data of this study. The main variables of interest are segment properties and measures of student involvement in segments. Both sources of data were collected at the class level on multiple occasions leading to some lack of independence in estimates of student involvement and segment properties when data are pooled across classes at the segment level.

The choice of the activity segment with its multiple qualitative features as the unit of analysis has methodological advantages and disadvantages. Conceptually the unit seems an effective choice relating to pedagogical activity in a useful and meaningful way. For descriptive purposes the decision to observe consecutive days of instruction in each classroom is adequate and perhaps advantageous.

Most statistical tests which are used for assessing relations among variables, for example the relationships between segment properties and student involvement, assume independence of units. Because segments are contributed to the data set in batches from classrooms a lack of independence occurs in PON estimates and in segment properties to some degree. The nature of these dependencies were described in previous sections.

Common inferential statistical procedures such as analysis of variance cannot be properly applied to data with these known dependencies if one has significance tests and statistical hypothesis testing as a major goal. Given the known violations of assumptions associated with these procedures, statistical significance testing is going to be largely eschewed in this research.

However, I will not entirely avoid the use of standard statistical procedures because they do point to the existence of certain directions of relationships and help to organize and display data in ways familiar to readers. Known statistical procedures are very helpful organizers of data as long as they are not relied upon as the sole mechanism for learning about phenomena. When results from inferential statistical procedures are presented they must be viewed with caution.

In this study major emphasis is going to be placed on data display and interpretation and less emphasis will be placed on statistical significance levels. Patterns of relationships and qualitative depth will be emphasized and whenever possible the reader will be asked to look at the data and decide if it seems to exhibit trends which their inspection confirms. One piece of useful evidence may be results from standard statistical procedures but they will not be exclusively relied upon. Given the interdependence in the data it is not obvious if statistical tests would consistently under or over estimate effects. Given the configuration of data, the reader will have to decide whether data patterns seem convincing. For this study I conclude that it is not entirely wrong to use routine statistical procedures but it is not entirely right either.

II. REPRESENTATIVENESS AND GENERALIZABILITY

The problem of interdependence in our data and implications for data analysis were discussed in the previous sections. Another methodological concern is representativeness and generalizability.

The sampling plan for this study was described in the chapter on research methods. The project was conducted within an explicit multi-level

framework. The levels considered were the school district, the school, classrooms within schools, instructional segments and groups within classrooms, individual children in classes and segments, and homes (parents).

Since a major purpose of the research is to describe classroom instruction, the question of generalizability and representativeness arises. Are the classes we studied representative of some larger population of classes? What is the external validity of our conclusions, how far can we generalize from our study results?

As a multi-level study, representativeness is a complex issue unless one can assume that a representative sample drawn at any level will insure representativeness at other levels. The school districts in which classrooms were studied were selected with certain SES and expenditure characteristics. The districts were meant to represent those cells as found in the greater Chicago area, but not to be representative of all school districts in the area. Because expenditure levels were restricted to high and low many schools with expenditures around the average level for the state of Illinois were excluded. Also small districts were excluded because we wanted schools with at least two fifth grade classes.

Since the study required cooperation from many people, there were some refusals at the district level. Similarly some teachers in some schools refused to participate. In addition parents had to consent to be interviewed and have their children observed. Children were selected at random for study, but if parents did not give permission the sample in a class was composed of only those children whose parents did so. At all three levels some degree of volunteer bias is present.

The districts and schools we studied can be described quite explicitly and provide a range of conditions and contexts in which fifth graders go to

school in a large midwestern urban area. The districts were a deliberate sample and they encompass a good spread with regard to school circumstances. The schools studied are representative of the types of schools and districts selected.

Aside from the matter of volunteer bias, a more profound issue is whether sampling at the district or class level guarantees representativeness at the segment level where most of my analyses are conducted.

In order for district level sampling to assure representativeness at the segment level instructional practices would have to vary regularly and exclusively with the demographic factors used in selecting districts. Such an assumption is clearly untenable. I view instructional arrangements as outcomes produced by many forces. The social and economic features of a district or community in which a school is located may influence the creation and use of instructional arrangements. Resource availability will also play a role. But other factors including parental preferences and values (Wimpelberg, 1981), school policy (Ferguson, in preparation), and teacher preferences, values and training also shape the conduct of instruction (Bussis, Chittenden & Amarel, 1976). The particular type of classroom, the children who compose the class (Barr & Dreeben, 1980), the age of the students, and subject matter are also potent variables. The factors mentioned are not an exhaustive list.

I assert that it would be almost impossible to do a study which was truly representative at the level of classroom instruction because we would need to know the full range of instructional practices in order to sample from them. More basic is the fact that using intensive observational work to describe practice precludes the kind of extensivity which would be necessary.

Another restriction on generalizability from our data is that we studied classes in the second half of the school year. Current knowledge does not provide sufficient data to estimate the degree of stability one finds in instructional practices throughout the school year.

Studies of teachers' behavior tend to indicate considerable stability in certain behaviors such as the ratio of teacher talk to child talk (Flanders, 1967). Much prior research has tended to focus on teacher behaviors in limited contexts such as recitation settings. Less is known about settings throughout entire days of instruction, materials used and grouping arrangements. Gump (1967) found considerable stability in activity segments over a short span of days.

Since I believe context to be very important, teacher behaviors and patterns of activity segments may only be highly similar across time when contexts are highly similar. Different units of instruction and different topics may produce changes in the conduct of instruction by the same teacher. Certainly teachers teaching different subject matters significantly alter the way classes function. On the other hand the general ecological features of a class in a given subject area will probably be fairly similar across a year. It is unlikely, for example, that a teacher who does not use group work in social studies in the first half of the year would do so to any extent in the second half of the year, or that children given options for activity in the first half of the year would be denied those options in the second half. What is true is that whatever learning is involved in getting a classroom going along certain lines will not be observed in the second half of the year, and both children and teachers will know one another and may have developed certain expectations about one another and "how things work."

This research is not based on a representative sample of classroom practices in fifth grades in math and social studies. However, the data base is derived from classes in districts with known characteristics which span a range of types of schools, resource levels and community types. believe that similar activity segments would be found in similar districts, but only future research can verify such a claim.

To some extent it seems more important to describe how intact classroom instruction occurs in a number of classes than to attempt to generalize to all instructional settings. I hope this research will demonstrate that average pictures often obscure the particular reality of a class or school's instructional organization. Aggregating across schools and segments will be useful for certain analytic purposes, but the validity of such aggregations must always be assessed. I believe that good educational research is often a matter of studying cases. Good generalizations in education come when principles are found that apply to a number of cases. This is a different goal than trying to be representative.

In actuality almost every study in schools is limited in its representativeness. I have tried in this section to explicate the specific ways in which the data base in this study is restricted. The study results should help to communicate some qualities of the classes and the type of instructional practices we observed.

III. THE EXISTENTIAL FALLACY AND EDUCATIONAL RESEARCH

In any study of social phenomena from which one might want to make inferences for action or set policy, it is especially important to understand a potential logical fallacy. It is called e existential fallacy

and it occurs when one thinks that knowledge of what is tells us what ought to be. It is easy to do. Reality as we see it, study it and live it has a compelling quality often making it seem that things as they are is the only way things can be. The existential fallacy goes one step further and sees things as they are as morally imperative -- if things were "meant" to be otherwise they would be otherwise.

In social science research and in educational research in particular, a somewhat milder form of the fallacy is common. Few researchers and writers talk in moral imperatives or even argue that things ought to be as they are. In fact, much educational writing is directed toward quite the reverse -- things ought to be different in schools, classes, etc. Yet the fallacy pervades much research because we do in fact study things as they are and draw conclusions about empirical relationships from things as they are. The danger lies in a lack of recognition of the ways in which the arena of school practice which we study is limited. A variety of well known researchers in education, particularly in the study of teaching, (e.g. Gage, 1978), argue for a strategy which takes us from correlational studies of teaching variables to experimental studies. They suggest that we will achieve a good "science" of teaching if we discover the variables which relate to outcomes in naturally occurring classrooms and then attempt to alter these behaviors in teachers through experimental manipulations, thus demonstrating their efficacy. While the strategy has some merit, our concern here is with the fact that it embodies the existential fallacy. It assumes that it is sound to use schools as they are as the place to find out about effective teaching. The problem arises because schools as they are may be a limited subset of all possible schools or schools as they could be feasibly enacted. If we define effective teaching, limiting ourselves to the present day arrangements, we exclude certain possibilities.

The limitations become clear if we consider the matter from an historical point of view. When whole class recitations and lectures were essentially the only instructional forms used, studies could only identify features of more effective "stand-up" teachers. Individualization of instruction through materials and small group teaching could not have been discovered as effective strategies because they were not in use in the classrooms of the day. Individualized methods are now taken for granted as valuable, but their adoption and use derived from considerations beyond extant good practice.

For purposes of description, we must study schools as they are. Hopefully, educational research can contribute to an understanding not only of schools as they presently function but also of why they are as they are. This is all to the good. But when one wants to go beyond description either to theory building or policy, other considerations must be brought to bear. It then becomes imperative to at least raise the issue of alternatives to what is in analyzing both empirical and analytic materials about schools and other social phenomena.

There are many ways in which the limits of our empirical work must be considered when attempting to move from description to general theoretical propositions or to policy. For example, achievement tests are often used as a pivotal index of schooling effectiveness. A careful assessment of the test content and goals would be necessary in order to decide how broad an inference should be made about school learning from such data. This is an example of how we can only learn empirically by carefully considering the actual empirical processes we have used.

The problem of limitations on knowledge can be broadly or narrowly considered. It will be important in our work and in reviewing that of

others to try to keep in view the breadth of generalizations which are possible from our investigation. I of course aim for some generalizability, but must realize that we too have only looked at some pieces of what is. The previous section of this chapter contained a consideration of the problem of generalizability as applied to this study.

When I focus on the descriptive phases of this research I can be reasonably confident that the reader will know where we have gone for answers and whether inferences are valid. Beyond that when I raise issues about educational alternatives the reader must recognize a movement from an empirical base for validation to other considerations emanating from values, philosophy and the art of educational practice.

IV. STUDENT INVOLVEMENT AND THE LACK OF ACHIEVEMENT DATA

In planning this research, consideration was given to the possibility of measuring achievement outcomes. Data on student learning and performance which could be related to educational practice, resource variables and other information would certainly be highly desirable. However, the problem of validly assessing student achievement in the two subject areas in a wide variety of classes could not be overcome with the resources available.

Why is measuring achievement across classes so problematic? After all, the newspapers regularly report the results of pupil performance on standardized achievement tests. Couldn't we have assessed student achievement with a recognized standardized achievement test which had national norms? Wouldn't test scores tell us which classroom environments were better and which worse?

Our judgement was that standardized tests would be very inappropriate for assessing student learning. Just the main reasons for this conclusion will be mentioned here.

Standardized achievement tests are constructed to sample objectives which are goals in a variety of curricular approaches. Since these tests are constructed to appeal to a national market, items are developed to coordinate with a variety of topics, only some of which will be included in any particular textbook or class program. In a recent study, researchers at Michigan State analyzed fourth grade math tests and widely used textbooks. They found a maximum of fifty percent overlap between the test item content and what was taught in a given textbook (Freeman, et al., 1980).

Mathematics in the elementary grades is much more uniform in its content and objectives than other subject areas such as social studies but the tests available would be a poor match to any given instructional setting in which a textbook was being followed as the main source. As our research confirms, social studies is much more diverse and very little match between curriculum content and any general test could be expected.

Standardized tests are meant to assess student performance on a year long basis. Our observations only covered two consecutive weeks of instruction, so the learning outcomes which would relate to our observations would have to be specifically tied to the unit of instruction. Since we did not know in advance what would be taught in each class we observed, it would have been extraordinarily difficult to develop assessment procedures. Further since so many different topics were studied in the classes, comparability of measurement across classes seemed virtually impossible.

There are many other objections to the use of standardized tests which I will not elaborate here (see Perrone, 1975). Perhaps a good solution for obtaining learning outcome data would have been to use teacher made tests and student work from the classes. The lack of comparability would be still be present with this approach. In retrospect some student work samples might have proved a valuable addition to the data set, but they would not have provided a scale which could be used across classes to measure the effectiveness of the classroom activities.

Since it was not feasible to obtain achievement data, we decided to assess student involvement in activities and student demand for resources. Measuring the way students used their time during instruction was a key data source for both Thomas and me. Much recent research, including some of my own earlier work, has shown that the ways in which students spend their time in classrooms does relate to learning.

Student involvement is something of a universal coinage because you can assess whether a person is on-task or engaged in an activity almost regardless of the activity. There are methodological difficulties associated with overt observation of student involvement during certain activities and in certain settings, but by and large an assessment can be made rather easily of whether students are behaving in accordance with the expectations of the setting.

It is also true that while student involvement does not guarantee student learning it generally is a necessary if not sufficient condition for learning. Children are not certain to learn if they listen to a teacher's lecture, do a seatwork assignment or cooperate with their peers on a common project, but the odds of some learning occurring are higher than if the children are inattentive.

Prior researchers in the classroom ecology area have assessed student involvement and found associations with certain features of the educational environment. Both Gump (1967) and Grannis (1978) studied student work involvement in younger children in classrooms. The prior research provided additional rationale for studying student involvement in settings.

I will review the specific findings of others regarding student involvement in another section. But it is important to recognize what this variable can and cannot do for us. In the analysis I plan to use student involvement as an indicator of the effectiveness or power of an activity segment. More specifically certain features of segments will be identified and their relation to student involvement will be assessed.

I will make the operating assumption that higher involvement rates indicate a more positive educational environment and a higher probability that student learning is occurring. But certain important caveats must be noted along with this assumption.

Higher levels of student involvement or attention are not always desirable. I do not subscribe to the implicit assumption in much research that more attention or higher levels of time on task should always be sought. Many investigators seem to assume that undivided attention, 100 per cent on-task behavior should be the goal. Those ideas are based on an overly simple view of student learning. We need more careful clinical studies of attention deployment in learning contexts to understand how effective learners actually function, but indications are that learning and insight involve periods of active involvement, time out and reflection.

It is often assumed that increments in on-task behavior at any point on the scale are equally valuable for learning. This also seems an incorrect assumption. A class setting in which children are engaged in activity

around 60 percent of the time is a very different place from one in which children are engaged 80 percent of the time. A ten percent increase in student attention in both settings can not be assumed to have similar consequences for student learning.

In this research we are only measuring overt signs of involvement. There is no way to know if the mental processes of students are relevant to a task when they look involved or uninvolved. A child staring into space may be contemplating a problem solution or simply looking out the window and an observer could not distinguish the two states. There is limited research using overt and covert measures of student involvement which has indicated a positive relationship between the two kinds of measures but also considerable independence in teacher-led settings (Ozcelik, 1973).

An overt measure of student involvement is probably a better indicator of underlying intellectual processes in some learning situations than in others. When the required action pattern is itself overt, overt measures will probably be good measures. When observable task actions are direct signs of student practice and success overt measures will probably be more closely related to learning. For example, when a student is working on a problem sheet in math and can be seen writing and progressing down the page it is likely that he is obtaining needed practice. Of course a much better indicator would involve knowledge that the problem set was at an appropriate level of difficulty for the student and that the child's performance was relatively accurate. Fisher et al. (1978) have incorporated some of these ideas of task difficulty into a measure of student involvement which they have called engaged time. Such measures are possible when the researcher has close control over the curricular practices in the classes being studied.

Other situations are probably well suited to overt measures of student involvement. Physical activities can be relatively easily observed. When children are working together it is possible to assess the nature of their joint efforts and communications. In these cases the overt index is based on observations of behavioral signs that are themselves clear indications that a required activity is taking place. The closer a measure of involvement is to actual learning components the more likely it is to be a good index of learning.

Activities which involve passive reception as the dominant action pattern may produce less connection between assessments of overt signs of attention and student learning. Children looking at a teacher lecturing may or may not understand what is being said.

It is also important to mention that involvement in activities which are not well designed for learning is not going to be particularly productive. Our analysis of educational settings will contain some information about the conditions of learning and much theoretical and empirical work is available for assessing the likelihood that a learning environment will be effective. These other factors will be an important element in reflecting on the conditions of learning we find related to student involvement.

This research does not directly address the connection between student learning and attention. However it will contribute to an understanding of environmental conditions associated with student involvement.

A skeptical view of the meaning that should be taken from a relationship between student involvement and educational arrangements is that involvement indices gage an audience response. This view reminds us that involvement and attention can occur for many reasons: interest, challenge, fear,

sociability might all be possibilities. In analyzing ecological features and their relation to student on-task behavior, I will attempt to ascertain whether educational factors are central in eliciting student attention or if other factors should be considered. The analysis of relations between ecological factors and PON will provide some insight into how overt involvement itself is shaped.

Summary

In this research student involvement measured by direct observation of behavior in classrooms is taken as an indicator of response to the educational environment. It is assumed that in general higher levels of attention in an activity segment indicate that the segment is well constructed for students. But the inference that students are learning when involved requires additional data which is not available in this study. It is a plausible assumption but the relationship is believed to be necessary and not sufficient. Attention for attention's sake is an unsound educational goal. Attention must be deployed to the right purpose. We may find high levels of attention in settings which are not believed to be productive for student learning or growth. Theoretical consideration of the nature of the educational setting and our empirical data is planned.

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Chapter 4

SUBJECT MATTER DIFFERENCES IN CLASSROOM ACTIVITY STRUCTURES

In the introductory chapter of this report, I presented a conceptual framework for analyzing the causes and consequences of instructional arrangements. Subject matter was discussed there as possibly having major impact on classroom activity structures. A variety of features of subject matter were examined and some existing research on subject matter differences in instruction were reviewed.

In this chapter I will examine the activity structures and segments found in the two subject areas we studied. Math and social studies provide an excellent contrast. Chosen because one represented a skill area or basic subject and the other an enrichment subject, the effects of these and other properties are evident in the classrooms.

Instructional time allocations in the two subjects are consistent with the basic/enrichment distinction. Math was taught more frequently and was almost always taught earlier in the day than social studies. Greater pressure for accountability and the sequential properties of the subject matter are other aspects of math which might make instruction differ from teaching in an area like social studies.

The main theme of this chapter is that there is considerable homogeneity in mathematics instruction while variety is characteristic of social studies instruction. Homogeneity is evidenced in the actual content of math instruction across classes as well as in the forms of instruction, cognitive goals and student behaviors. Social studies has more diversity in topics taught within and across classes, as well as variety in instructional formats, student behaviors and cognitive goals.

A topical description of the math and social studies curricula we observed can serve as a useful orientation. At the fifth-grade level, mathematics programs have an almost exclusive emphasis on developing competence in using algorithms and learning skills such as those applied to operations with whole numbers, fractions, and decimals. Instructional methods such as individualized instruction programs are suitable in mathematics because the topics covered are sequential in nature.

Social studies in fifth grade is not so easily described. There are a wide variety of texts and programs which differ in goals and topics. Usually no sequential properties inhere in the curricular topics except when a chronological presentation of historical developments is adopted. While mathematics is skill oriented, social studies is much less so.

Figure 4.1 contains a listing of the topics taught during our observation period. Each row in the figure represents a class we observed, so it is possible to see the range of topics included in all of the classes as well as the topics included in a two-week period of instruction in each class.[1]

In the math classes the continuity of topical coverage is fairly evident. For example, basic operations (addition, subtraction, multiplication and division) are taught in a predictable order. Similarly a class learning advanced operations with fractions, mixed numbers or decimals is likely to have had prior instruction in operations with whole numbers. Some variation in the topics we saw in math classes was a result of the fact that our observations spread over most of the second half of the school year (January to May). Nevertheless it is virtually certain that an observer in fifth-grade math classes would see instruction relating to operations with whole

[1]Summary descriptions of each class in the study are in Appendix C.

Figure 4.1

MATH TOPICS LISTED BY CLASS (N=20)

Whole Numbers	Fractions	Mixed Numerals	Decimals	Geometry	Other
+ - x ÷	+ - EF				
+ - x ÷	+ - x C, R, CM				
+ - x ÷	+ - x C, R, CM				
	+ - x R, CM, EF	CF		Perimeter	
+ - x ÷ E, F	R, CM, EF				
+ - x ÷ A	+ x R, CM, EF	Concept			Metrics
+ - ÷	+ x C, R, EF	Concept			
+ - x ÷	+ - x ÷				
				Line Segments, Angles, Polygons	Metrics
x ÷	+ - R	Concept			
+ x ÷ A	x CD, CM, CP	CD, CF	CF, CM		Percent
F	+ R, EF		CF, PV		Metrics
			+ - PV		Metrics
+ - x ÷ A	+ - x ÷			Area, Perim., Vol., Polygons, Graphing	
* x ÷ E, F	x ÷ R, CM, EF	x ÷			Sets
* + - ÷ F	+ - x R, CM	+ -	+	Line Segments, Hexagon	Roman Numerals
*	+ - x ÷	+ - x ÷		Angles, Graphing	
* + - x ÷ F	x R, CM	x CF		Graphing	
	x R, CM		PV		
÷	+ R, CM	+			

* The classes used an individualized mathematics program. The topics indicated are based on the observations of project students; other topics might have been covered by other students.

Figure 4.1, cont.

KEY TO MATH TOPICS

A = Averaging

C = Cancelling

E = Estimating

F = Factoring

R = Reducing

CD = Changing to Decimals

CF = Changing to Fractions

CM = Changing to Mixed Numerals

CP = Changing to Percent

EF = Equivalent Fractions

PV = Place Value

Figure 4.1, cont.

SOCIAL STUDIES TOPICS BY CLASS (N=19)

History	Geography	Society/ Culture	Economics	Current Events	Careers	Civics	Psychology
				yes		Purpose of rules	
Latin Amer.	Latin Amer.						
Latin Amer.	Latin Amer.						
Colonial							
Colonial	Colonial						
		Industrialization			yes		
	U.S.	Aztecs/ Modern Amer.			yes		
Old West	Rocky Mtn.			yes		Communism	Moral Dilemmas
Civil War	U.S.			yes			
Pacific U.S.	Pacific U.S.	Inventions	Pacific Natural Resour., Industry				
	Pacific U.S.						
		Israel					
Ancient(China)			Stocks	yes			
Settling New World(Simulation)		yes					
A. Lincoln	N.& S. Amer.						Family Problems
		Eskimos					
	Arctic Migration	Eskimos	Eskimo Div. of Labor, Nat. Resour.				
Colonial/ Civil War					yes		
	U.S.		Taxes, Profit Supply-demand			Purposes of Fed., State, Local Govts.	

numbers, mixed numerals, fractions and decimals. While some classes had instruction in geometry and some had lessons on the metric system, they were the two additional subjects observed. The homogeneity in topical coverage and the sequential nature of the material is very apparent in our classroom data.

Figure 4.1 also contains a listing of the topics observed in the social studies classes. While a number of classes were focused on aspects of history, geography and culture a presumption of similarity of content across classes would be inaccurate. The specific topics show much variety. For example, while half of the classes study history, Latin America, colonial America, Ancient China and the Civil War are all studied historically. Similar range is found in classes studying other fields. History, geography, anthropology, economics, psychology and civics are all taught to fifth graders. Also, children deal with current events and study careers.

We observed many different enactments of social studies. Some children were learning United States or Latin American geography, other children were investigating careers and occupations, some classes were studying the Revolutionary War and colonial American history and others used Man: A Course of Study (MACOS). We also saw children discussing family relationships and creating new societies, while others were making craft projects which were related to different countries' traditions.

Figure 4.1 shows the range of topics in the whole set of classes. But it is important to look across the rows to see how many different topics appeared in a class in a two-week observation period. Such an exercise illustrates that some of the classes had seemingly disjunctive curricula. Some activities, such as reporting on current events, occurred in classes on a predictable and regular basis and were not intended to integrate with

the rest of the study topics. But other classes seemed to jump from one topic or area of study to another in a confusing cafeteria style. Other classes, while encompassing a variety of topics were unified. For example, classes in which both the history and geography of Latin America were being studied or a class in which children learned about Arctic migration patterns, Eskimo society and Eskimo division of labor had curricular coherence.

The sequential nature of the arithmetic skills being taught in fifth grade must contribute to the same topics being studied in many classrooms. The fact that such a sequential ordering of topics is not usually found in social studies is certainly one reason that so much diversity of topics is present there. But it also seems that the inclusion of so many subjects under the umbrella of social studies leads to a potpourri quality in the content coverage in some classes.

I will now turn to an examination of the activity segment features in the two subject areas. The most general characterization of instructional segments, instructional format will be described first.[2] The codes for this variable incorporate well-established common sense ideas about major patterns of instruction. Table 4.1 shows the distribution of segments by instructional format categories, percent of total occupancy time in each category and the means and standard deviations for the durations or lengths of each segment category.

Segment distributions and occupancy time distributions provide different but complementary information. Because segments are units which vary in length or duration and because segments can contain the entire group of students or a subset of students in the class, different information is contained in these two measures. Occupancy time is derived by

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[2]Coding categories for all segment variables are defined and illustrated in Appendix B.

Table 4.1

Frequency Distributions, Percent Occupancy Time, and Mean Durations of

Math and Social Studies Segments by Instructional Format

FORMAT TYPE	MATH					SOCIAL STUDIES				
	N	Seg %	Occ Time %	$\bar{X}$DUR	SD	N	Seg %	Occ Time %	$\bar{X}$DUR	SD
Seatwork	144	26.9	29.8	21.7	12.0	69	12.7	21.8	20.2	11.7
Diverse Seatwork	14	2.6	3.8	30.4	13.7	26	4.8	6.1	26.1	11.7
Individualized Seatwork	59	11.0	13.7	34.8	10.3	-	-	-	-	-
Recitation	155	28.9	30.9	16.6	9.4	96	17.6	28.1	17.1	11.8
Discussion	2	0.4	0.4	15.0	7.1	19	3.5	3.1	9.7	7.4
Lecture	12	2.2	1.5	10.1	7.2	7	1.3	1.4	12.0	10.8
Demonstration	3	0.6	0.4	7.3	1.2	5	0.9	1.1	19.6	12.4
Checking Work	42	7.8	5.9	9.8	5.7	12	2.2	2.4	11.0	5.5
Test	18	3.4	5.1	21.1	10.2	10	1.8	3.9	24.5	17.6
Group Work	1	0.2	0.1	39.0	-	183	33.6	10.7	23.1	11.6
Film/AV	-	-	-	-	-	24	4.4	6.8	16.5	10.3
Contest	44	8.2	6.2	21.0	11.4	8	1.5	1.5	13.7	7.4
Student Reports	-	-	-	-	-	20	3.7	6.9	20.5	12.1
Giving Instructions	22	4.1	1.1	3.8	2.0	44	8.1	3.8	5.8	3.2
Preparation	11	2.1	0.6	4.5	2.2	14	2.6	1.6	8.1	2.9
Tutorial	8	1.5	0.2	21.5	9.1	-	-	-	-	-
Stocks	-	-	-	-	-	8	1.5	0.8	5.0	2.0
Total Instructional Segments	535	100.0	100.0	19.4	12.5	545	100.0	100.0	18.4	12.2

multiplying segment duration by the number of students in the segment. Segment distributions give equal weight to every activity segment. Occupancy time distributions and segment distributions are similar when most activities are whole class segments and depart when there are simultaneous segments or segments of markedly different durations. Occupancy time reflects pupil time allocations. Occupancy time distributions are a good indication of how a child would spend his or her time through the period observed. Segment distributions are more closely related to the way in which the teacher might plan and enact the instructional period from the point of view of her/his plans for the activities for all children.

Visual inspection of Table 4.1 clearly indicates that math and social studies classes are conducted using different distributions of instructional formats. In mathematics, seatwork and individualized seatwork during which children work at their own rate, together account for about 40 percent of the segments observed. Twenty-nine percent of math instructional segments are recitations. Checking work and whole class contests each account for about eight percent of the math segments. The distribution of occupancy time shows a relatively similar pattern to that of proportion of segments because frequently occurring math segment types are whole class and of relatively similar durations. However, individualized seatwork segments are relatively long compared to other math segments.

Social studies segments are differently distributed. Seatwork and recitation formats each compose 18 percent of the segments, while group work segments in which children are members of face-to-face groups are 34 percent of the social studies segments. Giving instructions, a format which often precedes small group work accounts for about eight percent of the remaining segments. Discussions, student reports, and film-audiovisual segments each

occur in about four percent of the social studies segments. Certain formats are essentially unique to each subject. In mathematics, individualized seatwork is a unique variety as is the infrequently occurring tutorial. In social studies, student reports, small group work, film-audiovisual, and stocks are unique forms. Stocks is probably the best example we observed of a truly integrated subject format. It consisted of children charting the progress of stocks on the stock market over days, calculating profits and losses, and analyzing economic trends. As such this form incorporates both math and social studies content and skills.

In social studies comparing proportions of segments with proportions of occupancy time results in notable differences. Since occupancy time weights segment durations by the number of pupils in the segments, the occurrence of small groups or part-class segments will reduce occupancy time proportions in those format categories. While about a third of the social studies segments are group work, students spend about 11 percent of their time in such segments. On the other hand about 28 percent of student time is spent in seatwork and recitations, respectively. Film/AV and student report segments each take about seven percent of students' time.

Overall, there is more variety in formats in use in the social studies classes than in the math classes. The greater variety seems evident across all classrooms, but is there also more variety in format use within a given social studies class? In order to answer this question, we have examined the number of formats used in each class, and the number of formats which occupy at least 19 percent of student time. The mean number of formats used in social studies (7.16) is significantly higher than the mean number of formats used in math (5.8) according to a t-test on the data from

the main data set ($t = 2.04$, $p < .05$). Table 4.2 contains the data relating to format use and dominant format use in both the main data set and the first-year classes. In all 31 math classes the mean number of formats used was 5.68 while it was 6.82 in the 28 social studies classes.

It is the case that variety of format occurs more frequently on a class by class basis in social studies than it does in math. From these data we can infer that not only are the classes and curricular approaches in social studies more varied from school to school, but that teachers in social studies classes tend to use more forms of instruction. The dominant formats in mathematics are recitations, the seatwork formats, and contests. In social studies seatwork and recitation also occur frequently but groupwork dominates in some classes.

In looking at Table 4.2 by rows a preliminary indication of the instructional patterns seen in the classes is obtained. Two variants seem obvious in the math classes. Most classes are following a traditional instructional pattern using seatwork and recitation as the primary formats. A small set of classes emphasizes individualized seatwork in which children work at their own rate along with stated objectives and a testing program which determines children's readiness to change topics. In social studies two major patterns also seem evident. Again one sees classes running along the traditional pattern using seatwork and recitation as the primary formats. Another set of classes uses small groups in which children are expected to cooperate for instructional purposes and in which children will be evaluated as members of a group. In both the math and social studies classes there are a small number which seem to be an admixture of these two main varieties.

Table 4.2

Format Use in Math Classes and Social Studies Classes
Second-Year Data

	Math Classes (N=20)			Social Studies Classes (N=19)		
	# Formats Used	# Formats > 19% OccTime	Dominant Formats	# Formats Used	# Formats > 19% OccTime	Dominant Formats
	7	3	Swk, Rec, IndSwk	5	3	Swk, Rec, GroupWk
	6	2	Rec, Contests	7	2	Swk, Rec
	9	2	Rec, Contests	7	2	Swk, Rec
	3	2	Swk, Rec	4	2	Swk, Rec
	4	2	Swk, Rec	5	2	Swk, Rec
	7	2	DivSwk, Rec	7	1	Rec
	4	2	Swk, Rec	10	2	Swk, Rec
	7	3	Swk, Rec, Test	6	1	GroupWk
	5	2	Swk, Rec	5	2	Swk, Rec
	7	2	Swk, Rec	6	1	Rec
	6	1	Swk	5	2	Swk, Rec
	9	1	Rec	8	2	DivSwk, GroupWk
	8	2	Swk, Rec	7	1	Stud.Repts
	6	2	DivSwk, Rec	6	2	GroupWk, TaskPrep
	2	2	IndSwk, Contests	11	1	Swk
	2	2	IndSwk, Contests	8	1	GroupWk
	6	1	IndSwk	10	1	Film/AV
	4	2	IndSwk, Rec	8	3	Swk, Rec, 'ilm/AV
	6	3	Swk, Rec, ChkWk	11	1	Rec
	8	3	Swk, Rec, ChkWk			
$\bar{X}$, SD	5.8 (2.09)	2.05 (.60)		7.16 (2.11)	1.68 (.67)	
Median	6	2		7	2	

Table 4.2, cont.

Format Use in First-Year Math Classes (N=11) and Social Studies Classes (N=9)

Math Classes: # Formats Used	# Formats > 19% OccTime	Dominant Formats	Social Studies Classes: # Formats Used	# Formats > 19% OccTime	Dominant Formats
7	2	Rec, Test	8	3	Swk, Rec, Lec
7	2	Swk, Rec	5	1	Rec
4	2	Swk, Rec	7	2	Swk, Rec
5	2	Swk, Rec, Test	6	2	Lec, ChkWk
6	2	Swk, ChkWk	7	1	Rec
8	1	Swk	9	2	Rec, Film/AV
6	3	Swk, Rec, ChkWk	5	3	Swk,Rec,Stud.Repts
4	3	Swk, IndSwk, Rec	3	2	Rec, Contest
4	3	Swk, IndSwk, Contest	5	2	Swk, Film/AV
4	3	IndSwk, Test, Contest			
5	1	Swk			
$\bar{X}$, SD 5.45 (1.44)	2.18 (.75)		6.11 (1.83)	2.00 (.71)	

While the multifarious nature of social studies classes is clear with respect to topical coverage and instructional format, an examination of other segment features is needed to round out the picture. Student behaviors, pacing, expected student interaction patterns, cognitive goals and feedback were all coded for each instructional segment. I now turn to those variables.

Does the finding of diversity in social studies show up in student behaviors? Each segment was coded for the main student behavior pattern found in it. Thirty possible categories were distinguished. Table 3 includes a list of student behavior patterns which occupied at least one percent of student time in each of the subject areas, along with the actual proportion of segments in which they occurred and the student occupancy time.

Two features of Table 4.3 convey its main story. Many fewer behavior patterns occur in the math than in social studies segments. Also, the distribution of occupancy times is distinct in the two areas. In math, one behavior pattern -- solving problems at one's desk -- accounts for over half the student time. Additional student time is spent in answering and asking questions, solving problems at the blackboard, watching others solve problems at the blackboard, checking work, and taking tests. In social studies more behavior patterns are used and student time is spread much more evenly across the behavior patterns. The most frequently occurring pattern is answering and asking questions in the context of oral reading (13% occupancy time) followed by about 10 percent of occupancy time in listening, and answering and asking questions, respectively. Eleven of the 20 behavior patterns seen in social studies are unique to the subject area. The analogous number is four for mathematics.

Table 4.3

Distribution of Student Behavior Patterns by Segments and Occupancy Time in Math and Social Studies

MATHEMATICS

Behavior Pattern	N	% Seg	% OccTime
Quest/Ans	55	10.28	9.13
Read/Oral	4	0.75	1.24
Solve/Desk	224	41.87	51.40
*BB-Solve	29	5.42	6.87
*BB-Watch	46	8.60	8.66
*Choral	8	1.50	1.46
Check Work	40	7.48	5.59
Listen	39	7.29	2.79
Test	19	3.55	5.43
*Tutor	8	1.50	0.25
Game-Cog	31	5.79	3.15
Q/A-O/Read	7	1.31	0.88
Other < 1%	25	4.67	3.14
Total	535	100.00	100.00

SOCIAL STUDIES

Behavior Pattern	N	% Seg	% OccTime
Quest/Ans	47	8.62	9.67
Read/Oral	8	1.47	4.94
Solve/Desk	37	6.79	5.53
Check Work	12	2.20	2.42
*Disc/Lis	52	9.54	6.41
*Film/AV	23	4.22	6.49
Listen	72	13.21	10.43
*Read/Silent	5	0.92	1.43
Test	10	1.83	3.94
*Write	30	5.50	3.78
*Research	38	6.97	6.84
*Draw/Paint	22	4.04	2.54
*Maps	23	4.22	7.67
*Graphs	12	2.20	2.09
*Crafts	27	4.95	3.02
Game-Cog	36	6.61	1.66
*Reh-Play	6	1.10	0.43
Q/A-O/Read	42	7.71	13.31
*Variety	26	4.77	5.00
Other < 1%	17	3.12	2.42
Total	545	100.00	100.00

*Behavior pattern occurs only in the designated subject area.

As was the case for instructional formats, it seems clear that more variety is characteristic of social studies instruction as evidenced by the types of student behaviors demanded. Is this variation a product of the many curricula which are in social studies classes or does it apply to individual classes as well? In other words, are the behavior patterns within social studies classes varied or do they simply change from class to class? Similarly, are the patterns relatively similar in math classes looked at individually?

Table 4.4 contains a listing of the number of student behavior patterns used in each class, the number of dominant behavior patterns (those that occupy more than 19 percent of students' time) and the names of the dominant behavior patterns along with their actual occupancy times. First and second-year classes are presented separately. (Each row represents a separate class.) For the main data set the average number of behaviors in social studies (8.8) is significantly higher than that in math (6.4) according to a t-test ($t = 3.07$; $p < .004$). In 31 math classes an average of 6.3 ($SD = 2.1$) behaviors occur while 8.3 ($SD = 2.5$) behaviors occur in the 28 social studies classes. The number of dominant behavior patterns does not differ by subject.

A closer inspection of the behavior patterns and their occupancy times in the math classes reveals a remarkable homogeneity in behavior pattern class by class. Every class but one in the first-year set shows students solving problems at their desks as a dominant behavior pattern with occupancy times ranging from 19 to 88 percent. Altogether nine different behavior patterns occur as dominant in the math classes.

Table 4.4

NUMBERS OF BEHAVIOR PATTERNS AND NAMES OF DOMINANT BEHAVIOR PATTERNS FOUND IN MATH CLASSES (N=20) AND SOCIAL STUDIES CLASSES (N=19)*

MATH CLASSES			SOCIAL STUDIES CLASSES		
# Bhvrs	# Dom. Bhvrs	Dominant Behaviors	# Bhvrs	# Dom. Bhvrs	Dominant Behaviors
8	1	Solve/Desk(59)	4	2	Disc-Lis(46), Variety(43)
6	3	Solve/Desk(33),BB-Solve(21),BB-Watch(19)	11	1	Research(27)
8	2	BB-Solve(26), Solve/Desk(19)	12	1	Research(21)
6	2	Solve/Desk(58), BB-Watch(22)	6	3	Q/A(23), Maps(21), Q/A-OralRead(25)
4	2	Q/A(22), Solve/Desk(61)	7	2	Q/A(33), Write(26)
10	1	Solve/Desk(44)	8	2	Listen(21), Q/A-OralRead(20)
6	2	Q/A(21), Solve/Desk(56)	15	2	Maps(20), Q/A-OralRead(29)
8	3	Solve/Desk(24), BB-Watch(29), Test(24)	8	1	Draw-Paint(43)
6	1	Solve/Desk(63)	9	2	Q/A(24), Q/A-OralRead(35)
6	2	Solve/Desk(45), Choral(30)	6	1	Read/Oral(51)
6	1	Solve/Desk(84)	6	2	Maps(42), Q/A-OralRead(46)
10	2	Solve/Desk(22), BB-Watch(20)	6	1	Crafts(66)
9	1	Solve/Desk(40)	10	2	Disc-Lis(31), Test(19)
5	2	Q/A(23), Solve/Desk(57)	9	2	Disc-Lis(35), Listen(28)
2	2	Solve/Desk(80), Game-Cog(20)	11	1	Listen(24)
2	2	Solve/Desk(78), Game-Cog(22)	8	1	Game-Cog(21)
5	1	Solve/Desk(88)	11	2	Film/AV(22), Listen(20)
7	1	Solve/Desk(67)	10	3	Q/A(21), Film(19), Research(21)
7	3	Q/A(25), Solve/Desk(31), CheckWk(20)	10	2	Q/A(27), Listen(22)
7	2	Solve/Desk(49), CheckWk(20)			
$\bar{X}$,SD 6.4	1.8		8.8	1.7	
2.2	.7		2.7	.7	

Total # Behaviors All Classes = 13   20

Total # Dominant Behaviors All Classes = 8   14

*Dominant Behaviors occur more than 19 percent occupancy time. Actual percent of occupancy time is shown next to behavior name.

Table 4.4, cont.

NUMBERS OF BEHAVIOR PATTERNS AND DOMINANT BEHAVIOR PATTERNS FOUND IN FIRST YEAR MATH CLASSES (N=11) AND SOCIAL STUDIES CLASSES (N=9)*

MATH CLASSES			SOCIAL STUDIES CLASSES		
# Bhvrs	# Dom. Bhvrs	Dominant Behaviors	# Bhvrs	# Dom. Bhvrs	Dominant Behaviors
10	2	CheckWk(28), Test(21)	9	1	Variety(40)
7	2	Q/A(28), Solve/Desk(51)	7	2	Q/A(30), Q/A-OralRead(37)
8	2	Q/A(30), Solve/Desk(35)	7	2	Research(28), Q/A-OralRead(26)
6	3	Q/A(26), Solve/Desk(29), Test(25)	7	2	CheckWk(23), Listen(23)
5	2	Solve/Desk(34), CheckWk(23)	10	1	Q/A(42)
8	2	Solve/Desk(38), Variety(27)	9	2	Film/AV(30), Listen(21)
6	2	Solve/Desk(40), CheckWk(32)	8	2	Listen(21), Q/A-OralRead(22)
5	2	Solve/Desk(67), BB-Solve(23)	3	2	Q/A(46), Q/A-OralRead(53)
4	1	Solve/Desk(57)	6	3	Film/AV(24),Read/Silent(27),Research(22)
4	3	Solve/Desk(36), Test(21), Contest(25)			
3	1	Solve/Desk(85)			
$\bar{X}$ = 6.0	2		$\bar{X}$ = 7.3	1.9	

Total # Behaviors All Classes = 16 18
Total # Dominant Behaviors All Classes = 7 8

* Dominant Behaviors occur more than 19 percent occupancy time. Actual percent of occupancy time is shown next to behavior name.

In contrast to the situation in math, in social studies 16 different behavior patterns are dominant. The occupancy times associated with these dominant behaviors in social studies are in the range of 20-40 percent of student time rather than taking more than half of students' time as is often true in math. This finding is supportive of more variety in classes as well as between them. However, it is also true that some of the diversity must be attributed to very different behavior patterns in different classrooms. Thus it seems that social studies classes are both more variable one from the other and contain more variety of student behaviors within individual classes. Student time in most social studies classes is not dominated by one behavior pattern as is true in mathematics classes.

In looking at instructional format some possible types of classrooms were identified in a preliminary way. Traditional classes which rely predominantly on recitations and seatwork were found in both subjects although they were more common in math. In math, the major departure from the traditional program was the use of individualized programs which incorporate a more precise specification of objectives and involve children working at their own rate. The individualized programs when used as an exclusive approach were very materials-dependent and contained very little human interaction either between children and teachers or among children. In social studies when there was a departure from the traditional instructional pattern, the major variant made use of small peer groups at work. The two subject areas, then, provide another contrast in that in some respects the more "modern" curricula in each move in opposite directions instructionally. Newer mathematics programs use teaching with technology and more progressive social studies programs attempt more effective utilization of human resources in conjunction with materials.

In considering curricular topics, instructional formats and student behaviors, a natural extension is an examination of the materials used for instruction. Figure 4.2 shows the types of materials used by students in the classes by subject matter. In the math classes textbooks, workbooks and worksheets are pervasive. Games, audiovisual materials (tape recorders for lessons), manipulatives and reference books are each found in a minority of the math classes. About half of the math classes have at least one of these types of materials used by children in addition to texts and worksheets While the quality and type of texts, workbooks and worksheets differ, the math classes still are relatively restricted in the range of experiences children have with instructional materials. Seven classes use only texts or worksheets. The materials in use are another way of demonstrating the relative lack of variety in math setting properties.

The social studies pupils use more types of materials during instruction. Textbooks are used in about two-thirds of the classes as are worksheets. However, audiovisual materials are used frequently, and maps and globes as well as reference books are common. Newspapers and magazines (usually weekly magazines produced for school use), craft materials, manipulatives and games are found in some classes as well. Unusual materials such as an Aztec stone and a parchment replica of colonial documents were also seen. As has been true with other features of classroom segments, the range of materials used in social studies is greater than in math both for all classes combined and within individual classes. From the child's point of view, the daily experience in social studies will be more varied in regard to materials used as well as in expected behaviors and the topics under study.

Figure 4.2

MATERIALS USED IN MATH (N=20) AND SOCIAL STUDIES (N=19) CLASSES

MATH

Txbk/ Wkbk	Wk Shts	AV	Game	Ref. Bks	News Mags	Manip
✓						✓
✓	✓		✓			
✓	✓		✓			
✓	✓					
✓	✓	✓				
✓	✓				✓	✓
✓	✓		✓			
✓						✓
✓				✓		
✓						
✓	✓					
✓			✓	✓		
✓	✓					
	✓					
✓	✓	✓	✓	✓		
✓	✓	✓	✓	✓		
✓	✓					✓
✓	✓				✓	✓
✓	✓					
✓	✓					

SOCIAL STUDIES

Txbk/ Wkbk	Wk Shts	AV	Game	Ref. Bks	News Mags	Manip	Globe/ Maps	Crft Mat.	Oth.
					✓			✓	
✓		✓		✓			✓		
✓		✓		✓			✓		
✓	✓	✓				✓	✓		✓
✓	✓			✓			✓		
✓	✓			✓	✓		✓	✓	
✓	✓			✓			✓	✓	✓
✓		✓			✓			✓	
✓		✓			✓				
✓							✓		
✓	✓	✓					✓		
				✓				✓	
		✓		✓	✓				
	✓					✓	✓		
✓		✓			✓	✓	✓	✓	
	✓	✓	✓	✓					
	✓	✓	✓	✓			✓		
✓	✓	✓		✓	✓				✓
✓	✓			✓			✓		

With the general characterization of the math and social studies classes available, I now turn to a more detailed look at other segment features. Pacing, an important organizing variable, is the first examined.

In prior ecological research, both Gump (1967) and Grannis (1978) found pacing to be a salient variable in their analyses of educational environments. Other investigators have also distinguished educational conditions by whether children are asked to work on their own or are working in direct interactions with the teacher. Pacing is an assessment of who is actually setting the rate of activity or work in a given segment. I have used four categories of pacing: child, teacher, cooperative (child-child), and mechanical.

Table 4.5 shows the distribution of pacing conditions along with occupancy times in the two subject areas. Teacher-paced segments occupy approximately the same proportion of students' time in the two subjects. The big difference is in the greater occurrence of cooperative pacing in social studies and the exclusive use of mechanically-paced segments in social studies. Because of the occurrence of these two forms, much less student time is spent in child-paced settings in social studies than in math. Children work on their own over half the time in math and less than one-fourth of their time in social studies.

The cognitive level of segments is another feature of central importance. A concern for cognitive level arises naturally in conjunction with an investigation of instruction. Intellectually, what processes are children asked to perform in math and social studies classes?

Every instructional segment was coded for the cognitive processes which were inferred to be the goal of the instructional task or activity. We developed a coding system which is essentially a modification of the

Table 4.5

Properties of Fifth-Grade Math and Social Studies Segments

VARIABLE	MATH					SOCIAL STUDIES				
	N	Seg %	Occ Time %	XDUR	SD	N	Seg %	Occ Time %	XDUR	SD
PACING										
Teacher	264	49.4	44.7	13.4	9.1	225	41.3	47.5	12.9	10.3
Child	226	42.2	51.2	25.1	12.7	106	19.5	33.5	22.3	12.7
Cooperative	45	8.4	4.1	26.4	12.5	191	35.1	12.5	22.9	11.7
Mechanical	-	-	-	-	-	23	4.2	6.5	16.5	10.6
COGNITIVE LEVEL										
Not-Cognitive	-	-	-	-	-	46	8.4	5.4	28.9	9.6
Receive/Recall Facts	90	16.9	10.3	9.4	8.6	182	33.4	36.5	12.6	10.2
Concepts/Skills	428	80.0	86.5	21.6	12.3	92	16.9	23.2	21.1	11.9
Research A: Locate Information	-	-	-	-	-	36	6.6	6.6	26.4	10.5
Research B: Symbolic/Graphic	-	-	-	-	-	51	9.4	13.8	19.1	15.2
Application	15	2.8	2.8	18.8	9.9	87	16.0	8.5	18.2	8.9
Other Higher Mental Processes	1	.2	.2	12.0	-	51	9.4	6.2	18.6	13.6
EXPECTED INTERACTION										
None	429	80.3	82.8	18.0	11.7	291	53.4	72.9	15.7	12.0
Low	42	7.9	10.2	22.1	14.1	50	9.2	11.3	15.4	11.1
Medium	40	7.5	5.2	28.9	14.3	110	20.2	8.4	22.0	11.4
High	23	4.3	1.7	25.0	13.3	94	17.3	7.4	24.2	11.4
TEACHER LEADERSHIP PATTERN										
Not-In Segment	73	13.6	10.1	26.0	14.3	21	3.9	2.2	16.3	11.6
Watcher-Helper-Intermittent	159	29.7	34.2	25.2	11.6	252	46.2	35.0	23.1	11.4
Watcher-Helper-Continuous	26	4.9	8.1	30.9	11.4	11	2.0	3.1	23.4	12.3
Recitation Leader	171	32.0	32.7	15.7	9.1	130	23.9	33.8	15.2	11.4
Instructor	27	5.1	2.4	6.7	5.9	40	7.3	5.4	9.5	7.8
Action Director	45	8.4	6.1	8.4	6.3	71	13.0	14.8	12.8	10.7
Reader	21	3.9	2.9	9.7	7.3	12	2.2	1.9	8.1	5.4
Tester	13	2.4	3.5	18.9	8.3	8	1.5	3.8	29.3	16.3

Table 4.5, cont.

TASK OPTIONS										
Teacher Task-Time	445	83.2	80.4	16.7	10.9	440	80.7	84.0	16.6	12.0
Teacher Task-Student Time	6	1.1	1.2	23.2	9.0	1	0.2	0.2	9.0	-
Student Task-Time	8	1.5	1.3	39.9	8.2	20	3.7	2.8	35.2	14.4
Student Task-Teacher Time	6	1.1	0.5	25.0	6.2	44	8.1	3.9	24.5	7.2
Teacher Task Time/S-Materials	2	0.4	0.1	41.5	17.7	36	6.6	8.0	23.9	8.6
Teacher Task Time/S-Order	9	1.7	2.8	26.8	11.4	4	0.7	1.2	16.8	2.6
Individualized Program	59	11.0	13.7	34.8	10.3	-	-	-	-	-
STUDENT LOCATION										
Desks	358	66.9	69.9	17.5	12.0	396	72.7	78.4	16.6	11.8
Office	40	7.5	3.1	32.5	11.0	-	-	-	-	-
Blackboard-Desk	78	14.6	15.8	17.2	9.4	-	-	-	-	-
Work/Table	-	-	-	-	-	19	3.5	1.6	25.0	7.7
Rug	-	-	-	-	-	14	2.6	1.2	18.6	9.8
Established Area	-	-	-	-	-	19	3.5	3.6	11.5	10.2
Work/Area	22	4.1	6.8	30.7	10.6	39	7.2	7.0	30.4	11.5
Resource Center	6	1.1	1.4	38.8	13.0	-	-	-	-	-
Library	-	-	-	-	-	18	3.3	5.0	27.1	12.2
Other < 1%	31	5.8	3.0	19.0	12.3	40	7.3	3.2	20.7	10.9
FEEDBACK										
None	75	14.0	12.5	14.0	10.9	35	6.4	7.0	13.3	11.8
Manipulative (2)	30	5.6	2.3	28.6	10.2	4	0.7	0.9	17.0	14.0
Books (3)	1	0.2	-	29.0	-	32	5.9	4.1	24.6	10.6
Self-Check (4)	19	3.6	2.7	29.3	17.6	3	0.6	0.7	17.0	9.5
Student Feedback	39	7.3	3.3	24.7	11.3	81	14.9	7.4	25.3	13.2
Teacher-Low	144	27.0	28.3	16.3	10.9	187	34.3	32.9	17.4	11.2
Teacher-High	61	11.4	13.0	18.3	10.3	21	3.9	4.6	15.3	14.1
Not Applicable	20	3.8	1.0	3.9	2.1	55	10.1	8.9	10.5	9.4
Textbook Only	41	7.7	8.6	23.0	10.9	14	2.6	3.2	17.5	12.8
Teacher-Low and 2,3,4	21	3.9	7.9	25.2	12.7	48	8.8	8.3	17.5	8.5
Teacher-Low and Text	58	10.9	13.5	23.2	12.2	59	10.8	20.6	20.5	12.2
Teacher-Hi and 2,3,4	25	4.7	7.0	23.4	14.5	6	1.1	1.4	26.5	18.0

Taxonomy of Educational Objectives (Bloom, 1956) and incorporates some ideas from Orlandi (1971) who discusses objectives in social studies curricula.

The system is partially hierarchical collapsing the six levels in the Bloom Taxonomy to four categories: Receiving and Recalling Information (Level One), Learning Concepts and Skills and Comprehension (Level Two), Application of Concepts and Skills (Level Three), and Other Higher Mental Processes (Levels Four to Six). Application and Other Higher Mental Processes are seen as more cognitively complex than the two lower levels. Two categories dealing with research skills in social studies were also defined. These categories encompass a variety of levels of complexity but are seen as at least Level Two. Research Skills A: Location of Information is often centered around obtaining and comprehending information as well as actually practicing reference tool skills. Research Skills B: Use and Interpretation of Symbolic and Graphic Data includes instances in which students read and acquire skills to read maps, graphs, charts, tables and cartoons. They also make symbolic materials such as maps, charts and graphs, learning to display information in symbolic form.

In addition to the six categories discussed, we occasionally found a segment which did not seem to have a cognitive goal either because the activity emphasized social or affective processes or because the tasks were so low level as to represent no real opportunity for cognitive learning by the children. The cognitive level of such segments was coded Not-Cognitive.

In terms of complexity, Not-Cognitive segments would be the lowest, next would be Receiving or Recalling Facts and Information, Learning Concepts and Skills, Research Skills A and B which range from the preceding level

upward, and Application and Other Higher Mental Processes which are considered similar in complexity. This is an approximate not a strict hierarchy.

What is the distribution of cognitive levels found in the activity segments we observed? Table 4.5 contains the distribution of cognitive levels in the instructional segments listed in the appropriate hierarchical order. As is evident in Table 4.5, math instruction is dominated by learning concepts, skills and algorithms in the fifth grade. As was clear in the topical analysis, most of the segments deal with learning operations with whole numbers, fractions and decimals and emphasize mastery of algorithms. Seventeen percent of the segments in math are at the low level of receiving/recalling facts. Many of these segments involve checking answers. Three percent of the segments involve application, the only higher mental process activity coded in the math classes.

Social studies shows much more variety in cognitive goals. There is considerable emphasis on the acquisition of facts and information at a lower mental process level, but higher mental processes and research skills are also goals of instruction. About a third of student time is spent on facts, about 23 percent on research skills and about 15 percent in various higher mental processes. Additionally, five percent of student time in social studies was devoted to tasks which did not have discernible cognitive goals.

It is appropriate to conclude that diversity in social studies is further evidenced in the area of cognitive processes as it was in topical coverage, instructional formats, student behaviors, and instructional materials. Variety of cognitive goals occurs within social studies classes as well as across classes.

Other ecological features we have examined in connection with subject matter differences are: expected interaction among pupils, teacher leadership

pattern, student options, student location, and feedback. I turn to a more detailed look at these variables now.

Student interaction was coded into four levels: none, low, medium and high. Low was coded when infrequent work-related interactions were allowed in the setting. Medium referred to segments in which some children were working together and others were not. High interaction was coded when children were expected to work together.

Table 4.5 contains the data regarding the expected interaction levels in our segments. In both subject areas student time is spent primarily under work conditions in which they are not expected to interact at all. Social studies segments do contain more instances in which interaction is either permitted or required for task accomplishment. Some interaction is expected in about 20 percent of the math segments and in 47 percent of the social studies segments. In terms of actual student time, however, only seven percent of student time in math is truly interactive (medium or high) and the comparable figure in social studies is 16 percent.

Clearly the fact that group work is used in many social studies classes accounts for the greater degree of interaction seen in that subject. The only format with high levels of interaction in math is children playing games in small groups.

While the lack of social interaction among children in the school setting may not surprise the reader, it is a fact worthy of some reflection about resource utilization in schools. There is some evidence, to be discussed elsewhere, which suggests that children can be effective resources for one another in their cognitive learning as well as in meeting interpersonal and social needs. Our data show minimal use of this resource and

a seeming rejection of the extent to which 10 year old children are socially motivated and concerned.

If the interaction patterns and instructional formats differ in the two subjects, how is the teacher's role coordinated with these different arrangements? Gump (1967) coded segments for teacher leadership pattern and we have slightly modified his categories and use them here. Since this variable relates to teacher behavior it is appropriate to examine segment distributions. The segment distribution reflects how teachers spend their time. Table 5 contains the relevant data for teacher leadership pattern categories in the two subject areas.

The most striking differences in teacher role are that the teacher is not in about 14 percent of the math segments while this is true in four percent of the social studies segments. On the other hand the teacher is an Intermittent Watcher-Helper in 30 percent of the math segments as opposed to 46 percent of the social studies segments, and the teacher leads recitations in 32 percent of the math and 24 percent of the social studies segments. In addition, the social studies teachers direct action in 13 percent of their segments and math teachers behave similarly in eight percent of their segments. Overall, the math teachers seem to do slightly more stand-up teaching but also leave students on their own more. This pattern reflects a two-segment activity structure which is common in math. The social studies teachers do a lot of supervision and give assistance intermittently, seemingly coordinating and orchestrating classroom activities somewhat more than math teachers. When teachers are with a group in math they seem more active than social studies teachers. When these data are looked at from a student time perspective, the main difference is that students are in segments with no teacher available about 10 percent of math time and two percent in social

studies. However, their activities are orchestrated but not actively paced by the teacher almost 15 percent of the time in social studies while this occurs for only six percent of math time.

Another way to look at the teachers' time and dispersion of energy is by examining the occurrence of simultaneous segments in the classroom. Whole class segments account for slightly more than half the segments in both subjects (51% in math, 58% in social studies). In terms of student occupancy time, children in math classes are in whole class segments 63% of the time while in social studies the figure is 81%. Thus the whole class segments tend to be longer and overall account for more student time in social studies. Also, there are multiple simultaneous segments in social studies, while in math the typical pattern is a two-segment activity structure.

From the teachers' point of view when she/he runs a class with simultaneous segments in math the structure is relatively simple. In math classes 24% of the segments are in a two-segment activity pattern and an additional 16% are in a three-segment activity pattern. Very few instances of more than three simultaneous segments occur. Typically the teacher is working with one group of children while the remainder of the class is doing a seatwork assignment. Another common pattern finds the teacher working with the majority of the class while a small group of children are working on their own because there is a math laboratory available or because the children have advanced status. In math classes it is unusual to see more than two or three simultaneous segments. Although individualized programs in which each child works at his own rate could be considered multiple simultaneous segments each with one child as a member, we have not chosen to make this distinction. From the teacher's point of view the instructional and

management demands of an individualized seatwork situation may be somewhat greater than a seatwork segment in which all children are doing the same assignment, but they are surely not comparable to running 25 simultaneous segments.

In social studies when simultaneous segments are in use, there are likely to be more than two segments running at a time. In the typical two-segment pattern found in math the teacher belongs in one segment and has peripheral connections to the other. In social studies, the situation is quite different. Usually a number of groups (often as many as six, seven, or eight) are working simultaneously and the teacher must monitor and assist each group as much as is needed. In this regard the teacher may be spread thinner than in the two-segment pattern. Typically the teacher does rotate from group to group or operates as a stationary resource to whom children can come with questions and requests. In order to effectively create an activity structure with multiple segments operating, time needs to be spent in preparation for the task. Thus we often see task preparation segments for the whole class which precede the establishment of multiple segments. Since the teacher is less available to each group as it begins operation, the importance of the task preparation segments in promoting effective work is underscored. We have observed very effective and very ineffective preparatory segments, and their consequences are fairly apparent.

Do children make more choices in one subject than the other? Our code for options addressed this question (see Table 4.5). Basically we find a strongly teacher-dominated curriculum in which over 80 percent of both math and social studies segments have tasks which are teacher-specified as to the actual task and the time in which it is to be accomplished. In math, about 11 percent of the segments are individualized programming in which

students work at their own rate on a specified curriculum but may have some choices about the materials they use. Three percent of the math segments are characterized by student selection of tasks. In social studies about 12 percent of the segments involve students choosing tasks and an additional seven percent contain student choice of materials in the context of a teacher-specified task. By and large, the students we observed had very limited opportunities to choose either what they were learning or working on or how they were to learn something. While other researchers have seen options as an important pedagogical variable (Grannis, 1978) the fifth-grade classrooms we studied operate almost entirely without activity options.

If one examines options class by class in social studies 10 out of 19 classes are totally teacher-specified; in three additional classes children may select materials to use for a teacher-assigned task and in the remaining six classes children can select tasks at least occasionally. In only one class is student choice of tasks a predominant mode, accounting for 67 percent of student occupancy time in that class. In the math classes 10 classes are totally governed by teacher specification of tasks. In six classes individualized programming is present and within such programs children sometimes have choices about materials to use for tasks -- a situation similar to student choice of materials for teacher-assigned social studies tasks. In four math classes children select tasks to work on but in only one of these classes do they spend a majority of their time in self-selected activity.

Generally then in both of these subjects options regarding choice of activity are negligible. While such options occur slightly more often in social studies than in math, child decision making, at least with regard to activities, is not a feature of the schools we studied. There is one school

district with two classes in which student choice occurs in both subject areas. The school is characterized by a more open or informal orientation than any other we studied.

Although the children we observed do not have many options in their work at school, sometimes teachers allow children more choice of activity when they complete assigned work. We looked at whether children had options for activity when they completed work, for example when they finished an assignment in a seatwork segment, and what such options were when present. Eighty percent of the math segments and 85 percent of the social studies segments had no options for children when they finished work. In the remaining segments where options were present children could either do subject-related work or complete unfinished work in any subject area. Occasionally children were also permitted the option of reading.

Another variable found in Table 4.5 is student location. We coded where children were situated throughout a segment, an indication of the use of space in the classroom and school as well as the formality of the class ecological structure. On this variable, as has been true in many others, we find somewhat more variety in social studies than in math.

Children in math classes can be found working in three types of physical locations: at their desks (70 percent occupancy time), some at desks while others are at the blackboard (16 percent occupancy time) and in another designated work area or office (10 percent occupancy time). In social studies children spend 78 percent of their time at their desks, five percent at the library, seven percent in other work areas, and smaller amounts of time in other locations. The slightly greater range of physical locations in social studies is consistent with the greater range of instructional formats and behaviors.

The last major variable to examine in this look at subject matter differences is feedback. Feedback refers to ways in which students can gain information about the correctness of their performance and/or gain assistance in accomplishing a task. At the upper elementary level feedback about correctness of performance is often delayed -- most commonly when children submit work to the teacher and it is returned at a subsequent time. But class periods when children are working on tasks can also contain feedback of various kinds. We conjecture that feedback availability will be most important when children are working on their own as is true in the typical seatwork situation.

Feedback was coded in all pacing conditions but somewhat different coding conventions were followed. Table 4.5 contains the distributional data. The types of feedback which are used in math and social studies classes are similar. Most feedback is provided by the teacher alone or in conjunction with materials. The distribution of categories and their occurrence differ somewhat by subject. In math students spend more time with no feedback available, and under conditions in which teachers are providing high levels of feedback, intensively interacting and supervising them. They also use the textbook as the only source of feedback more often in math than social studies. On the other hand, in social studies children are under low levels of teacher supervision and feedback more frequently and use books more often. They also provide feedback to one another more frequently in social studies.

In part these data on feedback reflect the relatively greater proportion of student occupancy time spent in teacher-paced segments in social studies and in child-paced segments in math. Feedback is most central in connection with children working on their own.

Most of the segment features coded have now been discussed with regard to subject matter differences in their occurrence and distributions. It must be recalled that the variables were all coded on the same set of segments and are by no means completely independent. Yet each feature adds some information, particularly for descriptive purposes, to an analysis of instructional settings.

Segment Patterns

We have examined segment properties in the two subjects one at a time, but the configuration of segment features tells us what the instructional experience is really like for both children and teachers. A frequency list of segments with different properties was created using the most salient variables coded. The number of segments, the percentage of segments, and the percentage of occupancy time was calculated for different segment arrays.

Table 4.6 contains a listing of segments and their properties created by looking at all combinations of pacing, format, teacher leadership pattern, student behavior, cognitive level, and student interaction. Table 6 contains segments with properties on those six variables which either accounted for more than 2.5 percent of the actual segments or 2.5 percent of student occupancy time. For purposes of this display such segments have been designated as high frequency patterns.[3]

As had been true in examining segment properties singly, the math segments are characterized by relatively few patterns which account for a large percentage of segments and occupancy time. Table 6 contains 13 patterns of math segments which account for 59.2 percent of math segments and 66.1 percent of student occupancy time. It should be recalled that all

[3] A complete list of all segment patterns is in Appendix D.

Table 4.6

High Frequency Segment Patterns Using Pacing, Format, Teacher Leadership Pattern, Student Behavior, Expected Cognitive Level and Expected Student Interaction

Pacing	Format	Teacher Leader.Pattern	Stu.Bhv Pattern	Exp.Cog. Level	Exp.Stu. Interact.	N	%	OccT%
MATH:								
Teacher	Recitation	Recit.Leader	Quest/Ans	Concepts	None	45	8.43	7.57
Teacher	Recitation	Recit.Leader	Solve/Desk	Concepts	None	14	2.62	4.09
Teacher	Recitation	Recit.Leader	BB-Solve	Concepts	None	19	3.56	4.74
Teacher	Recitation	Recit.Leader	BB-Watch	Concepts	None	37	6.93	6.49
Teacher	Check Work	Reader	Check Work	Facts	None	19	3.56	2.57
Child	Seatwork	Not In	Solve/Desk	Concepts	None	39	7.30	5.62
Child	Seatwork	Watch/Help-Int	Solve/Desk	Concepts	None	64	11.99	16.49
Child	Seatwork	Watch/Help-Int	Solve/Desk	Concepts	Low	11	2.06	2.69
Child	Ind.SeatWk	Watch/Help-Int	Solve/Desk	Concepts	None	31	5.81	5.28
Child	Ind.SeatWk	Watch/Help-Int	Solve/Desk	Concepts	Low	5	0.94	2.62
Child	Ind.SeatWk	Watch/Help-Cont	Solve/Desk	Concepts	None	8	1.50	3.80
Child	Test	Tester	Test	Concepts	None	9	1.69	3.14
Cooperative	Contest	Watch/Help-Int	Game-Cog	Concepts	Med	15	2.81	0.99
Total:						316	59.20	66.09
SOCIAL STUDIES:								
Teacher	Recitation	Recit.Leader	Quest/Ans	Facts	None	17	3.12	2.93
Teacher	Recitation	Recit.Leader	Quest/Ans	Concepts	None	13	2.39	3.48
Teacher	Recitation	Recit.Leader	Read/Oral	Concepts	None	5	0.92	3.32
Teacher	Recitation	Recit.Leader	Q/A-O/Read	Facts	None	16	2.94	4.83
Teacher	Recitation	Recit.Leader	Q/A-O/Read	Concepts	None	11	2.02	4.55
Teacher	Give Instr.	Action Dir.	Listen	Facts	None	21	3.85	1.56
Child	Seatwork	Watch/Help-Int	Maps	Symbolic	None	9	1.65	4.48
Cooperative	Group Work	Watch/Help-Int	Draw/Paint	Not Appl.	Med	17	3.12	1.86
Cooperative	Group Work	Watch/Help-Int	Game-Cog	Applic.	Med	19	3.49	0.50
External	Film/AV	Action Dir.	Film/AV	Facts	None	14	2.57	3.94
Total:						142	26.07	31.45

values available on these six variables would result in 313,200 possible patterns of segments.

The most common math patterns include teacher-paced recitations aimed at mastery of concepts and skills which contain students answering and asking questions, solving problems at their desks and at the blackboard, and watching problems solved at the blackboard. These teacher-paced recitations with no student interaction take up about 23 percent of student occupancy time in math classes.

Child-paced segments in math which are common involve children solving problems at their desks oriented toward the mastery of concepts and skills. The segments vary with the teacher present in some as an occasional helper and supervisor and absent in others. In a small percent of these seatwork segments, children are allowed to interact with one another for work-related purposes on a limited basis, but in most segments no interaction among pupils is permitted. These seatwork segments occupy about 25 percent of student time in math classes.

Individualized seatwork segments also occur with some frequency in math classes. As with other seatwork segments children are working on concepts and skills as cognitive goals and the teacher acts as a watcher-helper. Whereas children in regular seatwork settings work at times with the teacher occupied in other segments, children in individualized seatwork segments almost always have the teacher available in the watcher-helper role. Teachers rarely absent themselves from individualized seatwork settings to work with individuals or lead recitations. Student interaction is also very infrequent in the individualized seatwork settings. About 12 percent of student time in math classes occur in these individualized seatwork settings.

In looking at individual variables in the math segments, it was clear that a few features were very common in math classes. The data in Table 4.6 show how these features co-occur and the predictability of the child's experience in most math classes.

Table 4.6 also contains the high frequency segment patterns for the social studies classes. Again any pattern which was 2.5 percent or more of the segments or student occupancy time is listed. A total of ten patterns are high frequency in social studies and they account for 26 percent of the segments and 31.5 percent of student occupancy time. Many more combinations of variable properties occur in the social studies segments and fewer segment patterns predominate. As seemed true from the examination of the individual variables, social studies segments are more diverse. This pattern analysis adds the information that the segments contain more combinations of features in addition to the fact that more categories of variables occur.

Most of the high frequency patterns in social studies occur between three and five percent of student occupancy time and account for about three percent of all segments. While defined as high frequency, no pattern occurs a large percent of the time as was the case in mathematics. A number of the social studies patterns are teacher-paced recitations which encompass two cognitive levels (facts and learning concepts) and in which students' behavior patterns vary from answering and asking questions to oral reading and combinations of those two behaviors. All of the recitation forms included in the high frequency patterns occupy about 11 percent of student time. The other patterns in Table 4.6 include child, cooperative, and mechanical pacing and group work occurs as a format. A greater range of cognitive levels is also represented in the list as is a range of student behaviors.

In order to account for a large portion of segment patterns in social studies many more segment types would have to be included, each of which occurs relatively infrequently. In considering combinations of the six features used here, 110 segment types occur in math; in social studies 140 segment types were identified. Perhaps this is the clearest indication that students experience many more types of segments in instruction in social studies.

Discussion

The daily experiences of teachers and students are demonstrably different in the two content areas. Our data and other sources (Weiss, 1978) suggest that characteristic forms of instruction also tend to be associated with teaching in other subjects. While some variation exists in instructional approach to a given subject, it is likely that a small number of general types of instructional arrangements are used (Stodolsky, 1982). Our data show that individual teachers in the same physical settings with the same children use different classroom arrangements to teach math and social studies. Teachers vary cognitive goals, instructional formats and the ways in which children work or do not work together.

The activity structures used in the two subjects seem to contain certain features which might influence children's conceptions of learning and skills in learning. For example, social interaction among peers is not a common occurrence in either subject area, but mathematics classes are overwhelmingly solitary. Some social studies classes, although not all, are highly interactive and children's achievements rest on joint efforts.

Another way in which the activity structures differ is the predictability of the classroom experiences from day to day. Math classes are

more predictable for a child in terms of content, format, and expected student behaviors. Social studies classes are generally less predictable. The consequences of the routine nature of the math classes might be salutory or negative, this question deserves more study.

It may be that math classes contain clearer criteria or achievement standards for individual children. Individualized programs with regular tests as a part of them provide frequent information to children about their progress, as well as standards of performance. Frequent correction of work and problem sheets also provide regular and relatively clear achievement standards in math classes.

In social studies classes, standards of achievement may be less clear and less frequently available. Individual children in group settings may not be sure what contribution they have made to a collective outcome. Projects in social studies classes may be graded but they tend to involve longer periods of time during which achievement status may be unclear. Students may also feel that standards for evaluating social studies work are less objective and clear cut. Doyle (1983) has recently discussed the ambiguity students may feel about assessment of their writing.

The documentation of differing activity structures leads to questions about the impact of these forms on students' learning and attitudes. Since the conditions under which students are learning differ, are they developing ideas about learning which are unique to each subject? For example, through their instructional experiences do they view certain areas of learning as solitary and others as consensual. The material reviewed earlier in the section of Chapter 1, The Meaning of Learning, is relevant to these issues.

The strong connection between subject matter and classroom activity structures must be examined more deeply. Others, including Adams and Biddle (1970), Suydam and Osborne (1977), and Goodlad (1984) have found subject matter differences although they have not been exactly like those documented here. A basic question is whether the particular goals and features of each subject require (or seemingly mandate) differing instructional approaches. Or is tradition, as conveyed through a teacher's own experience as student and through subject specialist training the key explanation for these findings? An interesting future avenue for research would be a systematic analysis of teacher training methods books in various subject areas. Interviews with teachers about subject matter teaching would also be illuminating.

For example, while groups of children work on complex tasks together in social studies, face-to-face groups are formed in math to play games with less complex cognitive goals. Is this a curricular necessity? I speculate that individual production and attainment in math seem so essential that teachers do not consider joint efforts for "serious" learning in that subject. On the other hand, a stated goal of social studies programs is teaching awareness and consideration of others. An emphasis on citizenship and children learning to work together is thus a very direct pedagogical embodiment of desired outcomes.

Our findings may provide insight into instruction in basic and enrichment subjects at the elementary level. Instruction in the enrichment subjects such as social studies and science differs in a number of respects from that in the basics. Foremost is that less instructional time (sometimes none at all) is provided for enrichment subjects. But more diversity of curriculum and instructional arrangements also occurs in these areas. A deeper exploration of the reasons for these differences is warranted. Enrichment

subjects generally are less sequential. A lower priority is assigned to enrichment subjects and there is a lack of accountability in these areas (no one publishes standardized test scores in social studies). These features open up the possibility of more diversity in instructional practice and more diversity is found.

The problem of individual differences in learning is conceptualized differently in the two subject areas in a way that may also be more general. Individual differences in learning or learning rates are addressed more programatically in math and reading classes (the basics) than in social studies, science and other enrichment subjects. Instructional practices seem to reflect greater accountability for individual's learning in the basic than in the enrichment areas. Yet in enrichment areas uniform goals for learning are often assumed. Would strategies developed in math and other basic subjects for dealing with individual differences in learning have any application in enrichment areas?

There is some indication that specific curricular programs tend to be enacted with certain setting patterns. Topical constraints and cognitive goals are associated with the use of certain instructional forms. Interestingly, in math the more "modern" curricula tend to emphasize the use of technology and materials in an effort to respond to individual differences among children. An almost factory-like atmosphere was present in some of the individualized math classes. In social studies the more "modern" curricula tend to emphasize the use of groups and social processes to promote learning. The cognitive goals in math programs tend to be restricted with instruction in very small steps. The cognitive goals in the social studies programs are frequently more complex, challenging and somewhat open ended. Will increasing use of computers in schools alter this pattern?

In the first chapter, many factors which influence the nature of instruction were discussed. Effects at various levels, including school policies, curricular decisions, and class composition likely play a role in shaping classroom arrangements. Individual teacher's preferences and orientations are believed to influence the classroom environment, beyond the effects of subject matter and curriculum materials (Plihal, 1982). We are currently examining the classrooms of teachers with achievement or experience orientations to the rewards of teaching and varying preferences regarding teaching different subject matters (Plihal & Stodolsky, in preparation).

Our data indicate that elementary school teachers who are essentially generalists, can and do create a rather broad repertoire of organizational and pedagogical arrangements. The flexibility of teaching approach, tied to subject matter, suggests a broader range of teaching skill than is often assumed in the literature on elementary school teaching. I have recently discussed some of the implications of these findings for evaluation of teachers (Stodolsky, in press).

In the next chapter I will examine the relation among some of the key ecological features and children's involvement in activity segments. At this point it is interesting to note that although the presentation of the two subjects in classrooms varies greatly, children's average involvement to the two is virtually identical.

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Chapter 5

INTELLECTUAL ACTIVITY IN SEGMENTS AND STUDENT RESPONSE

The core function of schools is intellectual. But elementary schools are repeatedly found to be impoverished intellectually. The overemphasis on factual knowledge in teaching and testing is frequently bemoaned. Yet some educators argue that low level cognitive processes should be both the major ends and means in elementary school instructional settings.

In the previous chapter on subject matter differences, I presented data on the cognitive levels found in the activity segments we observed. In this chapter I will explore some ideas and existing data dealing with variation in cognitive goals in classrooms. I will then examine our data in more detail in order to see the conditions under which different cognitive goals were sought. In a careful examination of instruction one is interested not only in what type of intellectual activity occurs in school settings, but in the particular circumstances associated with progress toward attainment of different cognitive goals.

A primary avenue to understanding the nature of activity segments with differing cognitive aims will be to scrutinize the relationship between pacing and cognitive level. The role of format in connection with cognitive level will also be of interest.

In this chapter data regarding student response to instruction will be presented. Key features of segments will be examined in connection with student involvement. The association of involvement with cognitive complexity and pacing conditions will be the central focus.

Student response to instruction is hypothesized to vary with cognitive complexity. More complex and challenging activities are expected to promote higher levels of student involvement. Among others, Dewey and

Dewey (1915) and Whitehead (1929) argued that child-initiated activity, cognitive complexity and puzzlement have educative value. I also posit that children will respond positively to challenge and complexity. While learning activities must be examined from a number of points of view, I generally expect children to be more involved when they are in higher mental process activity.

Student involvement in pacing conditions will also be examined in this chapter. Previous research has shown that child-paced settings have low levels of student involvement. I will see whether those findings replicate in the fifth grades studied here. I will also consider the possible benefits of peer work groups as educational settings.

Some Related Research

Over the years there have been educators, philosophers, and psychologists who have argued about the appropriate means and ends of the educational process. How does learning occur? Do children want to learn? Does the human strive for homeostasis or activity? Is curiosity really the hallmark of childhood? If play is the work of childhood, what does that imply about schoolwork or schoolplay? How do we make children learn? What must children "have" to function in our modern world?

Differing conceptions of learning, and different views of teachers' skills and abilities are among the issues which have received attention. Forces leading to options in education have at times dominated and then been replaced by stress on standards and more uniform requirements. Historians of educational practice in the United States argue that swings of opinion have been quite regular although the depth of actual changes in school activities remains something of an open question (Church & Sedlak, 1976).

An illustration of educational swings is available in our recent history. The movement for open education which peaked in the middle 1960's was followed by "back to basics". A number of recent commissions are presently calling for more required academic courses in high schools. Very different ideas about learning and the necessary components of the curriculum are embedded in these shifts. Yet despite the dominant climate of any particular period, there have been some schools and teachers who have maintained a consistent educational philosophy and approach.

At times the research community has made rather substantial contributions to the formulation of these public stances. Recently, an influential idea, the direct instruction model, has been described. Direct instruction encompasses a set of instructional variables found to positively correlate with student achievement gains in reading and math (Berliner, 1979; Rosenshine, 1976). Data from some major studies were used as the basis for the formulation. Rosenshine incorporated findings from the Follow Through evaluation (Stallings & Kaskowitz, 1974), the Beginning Teacher Evaluation Study of second and fifth grades (Fisher et al., 1978), research by Soar and Soar (1976) and others. Using these process-product studies, a prescription for effective teaching was delineated. Direct instruction is an empirically derived amalgam not based on theories of learning or instruction.[1]

What variables have been found to relate to achievement gains? Rosenshine (1979) writes,

> direct instruction refers to academically focused, teacher-directed classrooms using sequenced and structured materials. It refers to teaching activities where goals are clear to students, time allocated for instruction is sufficient and continuous, coverage of content is extensive, the performance of students is monitored, questions are at a low cognitive level so that students can produce

[1]See the section on the existential fallacy in educational research in Chapter 3 for a critique of such empirically derived prescriptions.

many correct responses and feedback to students is immediate and academically oriented. In direct instruction the teacher controls instructional goals, chooses materials appropriate for the student's ability, and paces the instructional episode. Interaction is characterized as structured, but not authoritarian. Learning takes place in a convivial academic atmosphere. The goal is to move students through a sequenced set of materials or tasks. Such materials are common across classrooms and have a relatively strong congruence with the tasks on achievement tests. (p. 38).

Direct instruction relates primarily to teaching skills (reading and math) to younger elementary school children. Are the components of the direct instruction model consistent with findings derived from the ecological perspective? Gump (1967) examined classroom activity segments in traditional third-grade classrooms. Gump did not have learning outcome data, but he did assess student involvement and its relation to setting properties. He found student involvement in traditional third grades was highest under externally (teacher) paced conditions in small groups (primarily in reading circle). Children seemed to pay more attention to the required task when they were in direct supervisory contact with the teacher. Children were least attentive when asked to work on their own, usually during seatwork. Gump does not present an analysis of the cognitive components or goals of the tasks with which children were involved. However, his illustrative materials suggest an emphasis on skill learning in reading and math.

Grannis (1978) also examined segment features in basic (the three R's) and enrichment subjects in second-grade Follow Through classes. He found a difference in students' involvement in the two categories of subject matter. Student involvement was somewhat higher in enrichment activities than in basic activities. More important he found that degrees of consistency of controls among the variables pacing, options and feedback produced a regular pattern in basic subjects. If controls were consistent children had higher levels of involvement than when they were in activities with inconsistency.

For example, an internally consistent child-paced activity took place if children had the option to choose their own task and access to feedback while working on their own. An inconsistent child-paced activity occurred when children were assigned a seatwork task by the teacher and worked without access to feedback. Similarly, a consistent teacher-paced activity occurred when the teacher was running the activity (for example a recitation or lecture) and had control of the task and feedback.

Consistency of controls proved powerful in the basic subjects. As predicted by Grannis (1978), settings which were internally consistent had higher student involvement than inconsistent settings. However, internal consistency of controls did not relate to student involvement in enrichment subjects such as social studies, science, music and art. There are two plausible reasons for the lack of relationship in the enrichment subjects. Student motivation and interest may be higher in enrichment subjects so fewer supports for learning are necessary. Interested students may work at tasks even if the conditions are not optimal. The second explanation is that much less inconsistency of controls occurs in instruction in the enrichment areas. The Grannis second-grade data show that enrichment subjects are taught more consistently than basic subjects. The discrepancy is most apparent in child-paced settings when children are working on their own. In basic subjects the most frequent inconsistent setting is seatwork in which children are expected to work on their own but do not have choice of activity, access to feedback or the possibility of using one another as resources. Such settings produce low involvement rates. These child-paced inconsistent activities were very rare in the enrichment subjects. In terms of intervals Grannis coded, 42 percent were completely consistent in the basic subjects whereas 73 percent were consistent in the enrichment subjects.

The fact that children show higher involvement in subjects other than the "basics" might suggest that in addition to content and interest, the actual structuring of pedagogy in enrichment subjects may produce more involvement for children. The enrichment areas may include more diverse cognitive goals, including higher mental processes although direct data on this point are lacking in Grannis' publications. The enrichment settings did contain more student interaction than the basic ones, a fact which will be important when examining our pacing data. Subject matter differences consistent with Grannis are evident in our data on the use of seatwork. The format is used more often in math than in social studies, paralleling his second-grade data.

The Grannis data were not analysed for cognitive process. However, the basic subjects can safely be characterized as having predominantly lower mental process goals in second grade. Thus Grannis' findings on consistency of controls in the basic subjects is in keeping with the direct instruction model relative to teacher-directed skill learning. The conditions Grannis specified as consistent for child pacing are not present in the direct instruction pedagogy because child choice of activity is not part of the model. In fact direct instruction relates primarily to instruction provided by the teacher.

Taken together, the Gump and Grannis results seem to show that teacher pacing produces the highest involvement level among young children in basic subjects, particularly reading. But these findings are produced mostly in settings which are traditional. Thus internally consistent child-paced segments occur infrequently. One should not rule out the possibility of high involvement in child-paced settings in basic subjects. However, in the most common practice, child-paced settings are frequently internally inconsistent

and have low involvement rates. Cooperative segments with extensive child-child interaction are almost nonexistent.

The pattern of results in the Gump and Grannis studies helps explain how the direct instruction model emerged. Looking for correlates of basic skill learning gains which are found in most extant classrooms, the teacher-paced settings are the most commonly found. Similarly, the seatwork settings which are frequently less involving do not show up as positive correlates. If most child-paced settings are not very involving in basic areas, the recourse to the teacher-paced settings is clearer.

This is not the place to deal with the possible merits or problems in the direct instruction model and similar prescriptions. What is of interest is whether the findings from correlational studies from mostly primary grade basic skills areas will replicate in other teaching settings. The Grannis data, in particular, suggest that more diverse settings do exist and they may operate differently. The data I have presented on subject matter differences also suggests that more diverstiy of instructional practice may be found.

The cognitive goals and pacing arrangements in our math and social studies classes were discussed in the chapter on subject matter differences. I will briefly review the findings and then examine the variables together. Finally, I will present data on student involvement as it relates to cognitive level, pacing, and their joint distribution.

Cognitive Levels

In Chapter 4, I presented data on the cognitive goals of the math and social studies segments. It will be recalled that each instructional segment was coded for the cognitive process inferred to be the goal of the instructional

tasks and activities. The coding system was a modification of categories found in the Taxonomy of Educational Objectives supplemented with some from Orlandi (1971) relating to social studies. I postulated a hierarchical structure based on cognitive complexity essentially following the hierarchy in the Taxonomy.

A review of the findings presented in Chapter 4, will establish a number of important trends (see Table 4.5). In both subject areas there is a heavy emphasis on instructional segments at the first two levels of the Taxonomy. Instruction which facilitates children learning basic information and facts and being able to recall them (Taxonomy Level 1) is common, as is instruction which involves children learning basic concepts and practicing skills (Taxonomy Level 2). In math these two levels account for almost all instructional segments while in social studies information and comprehension activities occur in half of the segments. In math the Level 2 activities predominate and consist mostly of children practicing skills and learning algorithms. Concept learning and development, which is also Level 2, is not common in the math classes we observed.

While the cognitive goals in math are almost exclusively at the first two levels of the Taxonomy, there is much more range and diversity in social studies. Segments include research skills as goals. Application of concepts and skills (Taxonomy Level 3) and other higher mental process activities (Taxonomy Levels 4, 5 and 6) also occur in social studies. In addition some segments were classified as non-cognitive because no cognitive goal could be ascertained. Non-cognitive segments might be oriented to affective or social goals or simply be sufficiently devoid of cognitive content to be considered of educational value. The research skills were coded into two broad categories described by Orlandi (1971) as Locating Information, and Use

and Interpretation of Symbolic or Graphic Data. Such research skills are an important aspect of the social studies curriculum occupying about 20 percent of student time. These research skills were somewhat diverse in cognitive level but were placed as at least Level 2 in forming a hierarchy of cognitive levels.

The fifth-grade classes we observed in social studies contained instruction at many cognitive levels, including a noticeable share of higher mental process activity. In mathematics the cognitive levels were more restricted with a very large proportion of children's time spent practicing algorithms and mastering skills. A very small fraction of time in math was spent on application activities, primarily the solution of word problems.

One possible reason for diversity of cognitive goals in social studies is that individual classes are following curricula which emphasize different cognitive processes. To a certain extent such divergence of goals is present. For example, classes focussed on history and geography tend to be traditional in format, relying heavily on recitations and seatwork. Such traditional classes tend to be directed toward cognitive goals at Levels 1 and 2, as well as research skills pertaining to symbolic and graphic materials. Classes which operate in groupwork formats are topically focussed on other social science areas such as anthropology and psychology, and on such units as the study of careers. These groupwork classes also have cognitive goals at Levels 1 and 2, but additionally often orient toward application and other higher mental processes.

While topical and programmatic variety is characteristic of the set of social studies classes, most classes contain segments which are at a number of cognitive levels. While not every cognitive level is included in

every social studies class, more cognitive range is found in almost any given social studies class than is found in any math class we studied.

Cognitive Level and Pacing

Are the conditions under which children work toward different cognitive levels similar or are the activity segments arranged in a different manner depending on the objectives being sought? In order to answer this question efficiently, the pacing variable, a key organizer for the activity segment can be examined.

Pacing indicates who is the central actor in a segment, and who is primarily responsible for establishing the work rate. Pacing was coded into four categories: teacher, child, cooperative, and mechanical (see Table 4.5). Almost half of the students' time was spent in teacher-paced segments in both math and social studies.

In math, over half the student time is child paced. Students are primarily engaged in seatwork either in classes in which everyone works on the same materials or in classes in which the work is more individualized. In social studies children spend about one-third of their time in child-paced segments.

Cooperative pacing, in which children work together in groups occupies about 13 percent of student time in social studies. In math about four percent of student time is cooperative, mostly in contest format. Social studies also have mechanically-paced segments (about seven percent of student time) in which children are watching films or working with tape-recorded instructional materials.

What are the cognitive levels of tasks in different pacing conditions? Table 5.1 shows the distribution of segments categorized by cognitive level

Table 5.1

Distribution of Cognitive Process by Pacing in Social Studies and Math

Instructional Segments and Average Involvement (PON)[1]

Pacing	Teacher				Child				Cooperative			
Social Studies	(% OccTime = 47.5)				(% OccTime = 33.5)				(% OccTime = 12.5)			
Cognitive Process	N	%	$\bar{X}$PON	SDPON	N	%	$\bar{X}$PON	SDPON	N	%	$\bar{X}$PON	SDPON
Not Cognitive	---	----	----	----	8	7.5	53.9	27.3	38	19.9	73.7	22.9
Receive/Recall Facts	131	58.2	75.3	21.3	24	22.6	68.9	21.9	4	2.1	66.7	36.3
Learn Concepts/ Skills	40	17.8	73.5	17.1	24	22.6	76.2	22.0	28	14.7	82.4	14.6
Research Skills	28	12.4	74.6	19.9	39	36.8	78.0	14.1	20	10.5	84.3	15.1
Application & Higher Mental Processes	26	11.6	76.0	23.8	11	10.3	74.9	13.5	101	52.9	83.7	22.1
Math	(% OccTime = 44.7)				(% OccTime = 51.2)				(% OccTime = 4.1)			
Receive/Recall Facts	86	32.6	67.5	23.3	4	1.8	93.8	5.6	---	----	----	----
Learn Concepts/ Skills	169	64.0	77.3	15.8	216	96.0	79.4	13.9	43	95.6	83.8	22.7
Application & Higher Mental Processes	9	3.4	85.3	10.6	5	2.2	73.3	11.5	2	4.4	85.6	1.5

[1] Average PON is calculated for fewer than N segments because of missing observations.

and pacing for each subject matter.[2] Since social studies is where the most variety occurs in cognitive level, we examine that subject first.

A highly regular pattern emerges in the social studies data. Teacher-paced segments are primarily at the lower cognitive levels, with more than half consisting of receiving or recalling information. While the teacher is directing segments (recitations, giving instructions, task preparation, etc.) children are mostly expected to master factual information. Some teacher-led segments involve learning concepts and dealing with symbolic and graphic research material.

The child-paced segments are more evenly distributed across cognitive levels. Children working on their own engage in activities at all cognitive levels. They are more frequently found conducting research activities, receiving information, and learning concepts and skills. Activities with the most complex goals (application and other higher mental processes) occur less often as do segments coded as non-cognitive.

The cooperatively-paced segments in social studies show a very different distribution of cognitive levels. When children are working with one another they are given complex tasks, the majority having application and higher mental processes as objectives. However, 20 percent of the segments in which children are jointly engaged are coded non-cognitive. The cooperative condition is thus somewhat bimodal in cognitive level, encompassing the two extremes more than the other pacing conditions. But most activities of children working in groups are cognitively complex, dramatically more so than in either of the other pacing conditions, but especially more than the teacher-paced segments.

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[2]For this analysis, mechanical pacing has been eliminated because there are so few segments.

To summarize, social studies segments show systematic variation in cognitive level as a function of pacing. Teacher-directed segments have the lowest cognitive levels. Eighty-two percent of all social studies segments with receive/recall facts as the goal (Taxonomy Level 1) occur under teacher pacing. Child-paced segments are more variable, with most activities in a broad "middle" band of cognitive level. When children are asked to work in groups, the nature of the cognitive level shifts again. In the cooperative context we find complex tasks dominating along with a noticeable amount of activity with no discernible cognitive goal. Of all application and higher mental process segments, 73% occur under cooperative pacing.

In social studies, while a variety of cognitive goals are addressed, different contexts are created to foster different objectives. It is of interest, but perhaps some cause for concern, that the lower cognitive emphasis occurs in teacher-led segments.

Although the cognitive levels in math are much more restricted, is there any relation between pacing and cognitive level? Table 5.1 contains the math data. Children's main activity centers on learning and practicing skills and algorithms (Taxonomy Level 2). While a smaller proportion of segments are coded Level 1 in math, the teacher-paced condition contains almost all (96%) segments for which receive/recall facts is the goal. About one-third of the teacher-paced segments are at the factual level. Application which only occurs in 16 math segments is found in each pacing condition.

In both subjects there is a tendency for the teacher to direct activity segments which are at a low cognitive level. In social studies where many different cognitive goals occur, the teacher-directed segments are

mostly at the lowest levels. In math most segments are at Taxonomy Level 2, but almost every Taxonomy Level 1 segment is under teacher direction.

The fact that cognitively complex tasks are the object of children's joint efforts is consistent with theoretical arguments. Research I have reviewed elsewhere (Stodolsky, 1983) supports the efficacy of children working together to achieve higher cognitive goals. I have also distinguished various types of peer instructional groups including helping groups and cooperative groups. The literature suggests that cooperative groups may genuinely facilitate the cognitive development of children and be well suited for the achievement of higher mental process goals. Members of cooperative groups are sometimes found to produce higher cognitive levels of response than they can as individuals. Most of the cooperative segments observed in social studies were fully cooperative groups in which children were given a common task and all members were expected to contribute.

The distribution of pacing and cognitive level partly arises through curricular variation. For example, about half of the social studies classes used group work or cooperative settings while the others did not. Choice of pacing and instructional format is logistically connected to the curriculum in use and the topics being studied. Yet the trends in these variables seem to go beyond class to class variation. Teachers tend to lead low level activities even though they are usually the most knowledgeable and experienced persons in the educational setting.

From the data one may infer that children will expect to work differently as pacing arrangements change. A major difference will be the type of task and cognitive processes expected. Children can expect least challenge when under teacher direction, variety and middle level challenge when

working on their own, and the highest levels of cognitive challenge when working with one another.

Later in this Chapter, I will examine the various formats used by teachers. Uncovering the pedagogical purposes of different teacher-paced segments may help to explain the general pattern found between cognitive level and pacing.

Student Involvement

How do children respond to different segment properties? Does student involvement vary with cognitive level, pacing, or combinations of these features? Let us turn to these data now.

Every activity segment in which sample children participated has an associated estimate of student involvement expressed as the percent of obser vations coded as "on" (PON) out of all observations made during the segment. All segments for which such estimates are available were sorted by cognitive level into five categories forming what was postulated to be an approximate hierarchy of complexity. As indicated earlier in this chapter, I hypothesized that children would respond favorably to cognitive complexity and chal lenge and therefore predicted increasing average student involvement levels with increasing cognitive level. My son, Danny, in one of his early stories described heaven as a place where one is happy in a world of self-made challenges. His view of the value of both options and complexity is in line with the position being tested here. Do the data show that fifth graders respond similarly? The relevant data are in Table 5.2.

In social studies where there is the most diversity in cognitive leve there is a perfect correspondence between the rank order of complexity and the rank of student involvement. A more limited test is available

Table 5.2

Mean Involvement (PON) for Segments Ordered

By Complexity of Cognitive Levels

Cognitive Level	Social Studies		
	N*	$\bar{X}$ PON	SD PON
Not Cognitive	35	71.3	23.5
Receive/Recall Facts	178	74.9	21.2
Concepts/Skills	85	76.5	18.1
Research Skills	73	77.9	17.0
Application and Higher Mental Processes	118	81.3	22.1
Total	489	76.8	20.6

	Math		
	N*	$\bar{X}$ PON	SD PON
Receive/Recall Facts	84	68.4	23.4
Concepts/Skills	382	78.9	15.7
Application and Higher Mental Processes	16	81.6	11.3
Total	482	77.1	17.6

*N is the number of segments for which PON estimates are available.

in mathematics, but the same pattern occurs. In both subjects an average of at least 10 percentage points separates the highest and lowest cognitive levels. Since we have usually found subject matter differences, it is particularly striking that the cognitive level variable shows the same pattern in both areas.

These data seem a clear indication that children are more involved in activities with higher cognitive goals. The average level of attention seems graded to the level of complexity of the instructional activity. It is not clear whether cognitive complexity is associated with higher involvement because the tasks are more difficult and require more attention, if children's interest level is increased by more challenging tasks, or if other features of the settings in which the tasks are accomplished play a role. While we cannot definitively sort out these factors, we can examine the data further.

Since pacing has been found to be a key organizing variable by others and is systematically related to cognitive level in our data, an examination of student involvement under different pacing conditions is warranted. Table 5.3 shows the average student involvement as a function of type of pacing.

Looking at the math segments first, the teacher-paced segments have the lowest average involvement rates whereas the cooperative segments are the highest. Student attention is also fairly high in the child-paced segments.[3]

The low level of attention in the teacher-paced segments in math is at variance with prior research which has shown that teacher pacing

[3]A one-way ANOVA on pacing in math shows a highly significant effect ($F = 7.45$, $p < .0007$) and a Duncan's multiple range test indicates that the teacher-paced segments have a significantly lower PON average than the cooperative- and child-paced segments.

Table 5.3

Mean Involvement (PON) for Math and Social Studies Segments

by Type of Pacing

	Math			Social Studies		
Pacing	N*	$\overline{X}$PON	SD	N*	$\overline{X}$PON	SD
Cooperative	34	83.9	22.0	149	81.7	20.7
Child	195	79.5	13.9	95	73.2	20.0
Teacher	253	74.4	19.0	222	75.0	20.7
Mechanical	---	----	----	23	79.7	17.1
Total	482	77.1	17.6	489	76.8	20.8

*N is the number of segments for which PON estimates are available.

produces high attention levels. The direct instruction model relies on teacher direction because it is presumed to promote high student involvement. Also, previous investigators have found that student involvement is lower in child-paced settings in math, but this finding is not replicated in our math data.

One explanation for the difference in our data is that most prior research has been with children at lower grade levels. Younger children may be less capable of sustained attention in seatwork settings and therefore profit from more direct teacher supervision. Another important factor is that fifth-grade children doing seatwork tasks usually expect that a certain amount of work must be accomplished per day or per week. If the work is not completed during school time it becomes homework. Since fifth graders cannot avoid task accomplishment, they may work harder or more efficiently during time provided in school than their younger counterparts. In most primary classes children work for a period of time, put the work away, and pick up where they left off during the next work period provided. Children's abilities to work independently and expectations for task accomplishment may vary across grade levels and subject matter and have systematic correlates with student involvement.

In both math and social studies, cooperative segments have the highest level of student involvement.[4] Children seem to find small face-to-face

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[4]A possible methodological explanation for this finding needs discussion. The expected work patterns under different pacing conditions vary and some problems in observer accuracy may arise.

In a small group setting interactions among children are an expected part of the work pattern, whereas in most child- and teacher-paced segments interactions among children are not sanctioned. An observer noting an interaction among children under child- or teacher-pacing is likely to assume the interaction is off-task, unless evidence presents itself to the contrary. Similarly, in the small group setting an observer would be likely to assume that interaction was work-related unless evidence that it was socializing or off-task was available. Giving children the "benefit of the doubt" in the

work settings particularly engaging. In math cooperative settings occur infrequently and are usually games or contests. In social studies, group work segments usually involving complex tasks are the norm.

In addition to cooperative segments, three other pacing conditions are present in social studies. Children show high levels of attention when in audiovisual settings. In contrast to math, the child-paced segments have the lowest involvement while the teacher-paced segments have a slightly higher average PON.[5]

There is no clear-cut explanation for the fact that the child-paced segments in social studies have lower average involvement than the teacher-paced segments, reversing the pattern seen in math. Actually, the differences are small. But the fact of the reversal indicates that child pacing

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small group setting, might account for the somewhat higher on-task rates in these segments if one attributed some of the difference to overestimation of work-related interactions in small groups.

Is it possible to eliminate this possible source of bias in our data? A number of points can be made to suggest it is not a major bias, but it is not possible to totally rule it out. First, acceptable levels of reliability were achieved among observers. In many cases, but not all, the observer was able to actually hear the content of the interactions and these are recorded on the time sampling sheets. Inferences when the observer could not hear accurately are the only source of potential problems and are a relatively small subset of all observations. In other pacing conditions, observer locations are sometimes not ideal, and best guesses are made from general non-verbal and bodily cues. Similar inferences were made recording interactions in small groups.

The strongest argument against the methodological bias seems to be the fact that systematic trends within group work segments can be detected. In particular, as we will see in the succeeding section, cognitive level differences in group work tasks are associated with more or less student involvement. The fact that these differences emerge, supports the idea that in most cases observers were in fact able to distinguish work-related from socializing episodes in the groups.

[5]A one-way ANOVA on the four pacing conditions in social studies shows a high overall effect ($F = 5.48$, $p < .001$). A Duncan's multiple range test shows that the cooperatively-paced segments have a significantly higher average PON than the other three pacing conditions which are not statistically different from one another.

per se is not consistently associated with high or low involvement. The one arrangement found to consistently relate to higher levels of involvement in the two subjects is cooperative pacing.

Earlier we looked at the joint distribution of pacing and cognitive levels in the two subjects. Can one explain the differences in average involvement under different pacing conditions by the cognitive levels found in the segments? Alternatively, is there an independent contribution of pacing and cognitive level to student attention levels? Table 5.1 contains the means and standard deviations for student involvement (PON) arranged according to subject matter, pacing, and each of the five cognitive level categories used in the hierarchical analysis.

The data in Table 5.1 suggest that both features of the setting, pacing and cognitive level are important correlates of student attention. It seems that one feature is more important than the other in certain groups of segments. For example, the level of involvement in the teacher-paced social studies segments taken in the aggregate is very consistent across cognitive levels. Students exhibit moderate levels of attention when under teacher direction and the cognitive level of the segment does not alter their response. Analysis of format combined with cognitive level actually results in a somewhat different conclusion to which I will return (see The Role of Format in Teacher-paced Segments).

Child-paced social studies segments have the lowest average involvement overall, but the cognitive level of the segment does seem to relate in part to student attention. In particular not-cognitive and Level 1 segments have much lower student involvement than those with higher levels. It seems that both pacing and cognitive level contribute to the involvement pattern found in segments with children working on their own. Children asked to

independently do tasks which contain no cognitive goal or are simply factual are less involved than when pursuing tasks involving attaining concepts, using research skills, or various higher mental processes.

Similar findings emerge in the cooperative-pacing condition. Children are most involved when working together in groups, but the assignment of unchallenging tasks such as those we coded not-cognitive results in lower attention even in the group work setting.

The math segments show little variation in cognitive level. Only the teacher-paced segments can be examined for the role of cognitive level on student attention in math. Low level cognitive goals in the teacher-paced math segments have much lower student involvement than those directed toward learning concepts and skills or application. The activities teachers conduct at a factual level must be scrutinized for possible insight into this finding.

This corpus of data seems to show that multiple features of learning environments are related to the extent of student involvement (and presumably to student learning). Characteristics of learning settings do not operate alone and must be considered in light of the subject matter, curriculum, grade level, instructional format and other relevant factors.

To summarize, student involvement has been shown to relate to both the type of pacing and the cognitive level of segments. A clear pattern of increasing involvement as a function of cognitive complexity is present in both subjects. This finding gives rise to serious questions about the direct instruction model and other prescriptions for low-level teaching.

There is also a consistent finding with regard to pacing in both subjects. Children's average involvement is highest when they are working cooperatively. Such a finding gives rise to questions about current practice

which tends to assume individually-oriented instruction will be most efficacious.

An inconsistent pattern of involvement is present in teacher-paced segments in the two subjects. In the math segments, cognitive level seems to relate to student involvement but in social studies this is not the case. Overall, children are similarly involved in teacher-led activities in both subjects. Perhaps a closer look at the type of activities teachers pace will clarify this result.

The Role of Format in Teacher-paced Segments

What are teachers doing instructionally when they lead segments at a factual level? Why do students respond to the cognitive level of teacher-directed lessons in math but not in social studies? Are teachers leading recitations at a purely factual level? What pedagogical functions are being served with low level teacher-directed segments? An analysis of teacher-paced segments taking format into account will help to answer these questions.

Table 5.4 shows the formats used by teachers while directing segments with receive/recall facts as the goal. In math, approximately half of the segments (47%) at Level 1 are checking work while an additional 35 percent are giving instructions and task preparation. A small number of math recitations and lectures are also at the factual level.

In social studies a larger percent of the factual teacher-led segments are recitations (33%) but task preparation and giving instructions (43% combined) also figure prominently. A relatively small number of segments are checking work.

Table 5.4

Distribution of Formats in Teacher-Paced Segments

at Factual Cognitive Level

	Social Studies						Math					
Format	N	Seg%	$\bar{X}$DUR	SDDUR	$\bar{X}$PON*	SDPON	N	Seg%	$\bar{X}$DUR	SDDUR	$\bar{X}$PON*	SDPON
Recitation	43	32.8	14.3	10.5	71.1	21.1	6	7.0	22.7	9.4	77.4	16.9
Giving Instructions	43	32.8	5.7	3.1	75.5	23.6	21	[illegible]	3.8	2.1	66.9	30.3
Task Preparation	13	9.9	7.9	2.9	82.8	15.4	9	10.[illegible]	4.7	2.5	57.3	30.5
Check Work	11	8.4	10.7	5.7	82.5	5.3	40	46.5	[illegible]	5.6	66.1	18.1
Lecture	6	4.6	10.2	10.6	86.2	6.1	7	8.1	[illegible]	7.5	78.5	21.1
Student Reports	4	3.1	23.3	12.3	59.6	[illegible]	---	----		----	----	----
Discussion	3	2.3	8.3	5.0	56.4	36.6	---	----	----	----	----	----
Demonstration	3	2.3	20.0	11.8	56.3	----	1	1.2	[illegible]	----	100.0	----
Test	3	2.3	21.3	7.8	85.5	5.3	2	2.3	18.0	----	77.1	----
Film/AV	1	0.8	18.0	----	90.9	----	---	----	----	----	----	----
Seatwork	1	0.8	8.0	----	100.0	----	---	----	----	----	----	----
Total	131	100.0	10.8	8.8	75.3	21.3	86	100.0	8.7	7.0	67.5	23.3

*Mean PON is calculated on slightly fewer than N segments due to missing observations.

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Preparatory Segments

The particular function of preparatory segments in the flow of the activity structure shows qualitative differences in the two subjects. Task preparation and giving instruction segments while superficially similar are unalike when they occur in math and social studies.

In math preparatory segments usually occur prior to seatwork segments. Students are typically told which problems to solve, when their work is due and the form to follow. Occasionally the teacher will briefly illustrate a problem or remind students to be careful about a procedure. For example, teachers might tell students to find the lowest common denominator in solving problems with addition of fractions. Preparatory segments in math tend to be short (approximately four minutes). They are highly routinized and students can easily ascertain and/or predict what to do in the next segment or for homework. The textbook or worksheet often provides sufficient information for many students to be able to proceed without teacher directions.

In social studies preparatory segments are longer (approximately seven minutes). Most giving instructions and task preparation segments occurred prior to group work activities which tended to be novel and complex. Children needed the information contained in these segments in order to work together. For example, these segments contained details about how to play games such as the Caribou Hunt which is part of the MACOS curriculum or Sailing to the New World which involved making decisions about supplies for explorers' ships, or how to execute a project such as making a booklet about black stars. The activities were not familiar ones and the preparation segments were more than reminders -- new and necessary information for almost all children was being presented.

Although the cognitive level of teacher messages in preparatory segments was factual in both math and social studies, the novelty and prerequisite nature of the information differed in the two subjects. Social studies preparatory segments more often contained information essential to pupils who were about to enter work groups. In math, students heard highly routine and predictable messages. The pedagogical function served in math was more perfunctory, seemingly reflexive.

Students' response to the preparatory segments in the two subjects seems to follow their information needs. Table 5.4 shows pupils' average involvement. Student attention in the math preparatory segments is lower than in similar segments in social studies. The extent of new information transmitted in these segments seems to differ and apparently students' responses are in accord with their need for the information. Within each context, students seem to respond to the actual functional demands of the segments.

Checking Work Segments

The other main category of factual teacher-led segments is checking work. Checking work was coded as a format when the activity was relatively restricted. Teachers did not explain why work was correct or incorrect in check work segments (such cases would have been coded recitations or lectures) but simply communicated correct or incorrect answers or called on students to give answers. Some check work segments reduce to interchanges about the mechanics of grading and whether someone can gain credit under particular circumstances. The action pattern is not very demanding and may be boring for some children. Checking work is a routinized activity which

may move slowly. Like the preparatory segments in math, high levels of attention may not be warranted by the nature of the activity, and students' level of attention in check work segments is quite low (see Table 5.4).

A small number of teacher-paced factual segments are checking work in social studies. Average student involvement is high. A number of features of these check work segments may account for the higher involvement in social studies. First of all, the activity is an infrequent one for students, not an expected part of the daily routine. A number of the segments involve correcting tests or correcting assignments which are somewhat unusual like crossword puzzles and Rebus worksheets. The materials being checked were either intrinsically more interesting or demanded more attention to the task as when a child needed to decide if a particular definition should be considered correct.

The preparatory and check work segments in math account for most of the segments coded at Level 1. The low levels of attention in these segments suggests that format and pedagogical purpose must be considered along with such features as pacing and cognitive level. The general picture of higher involvement with higher cognitive level, must be augmented by an examination of the functional and pedagogical importance of the material being communicated. If basic factual information is important to the flow of activity, students seem to adjust their attention level upward. If factual information is redundant, repetitive or parcelled out slowly, students seem to adjust their attention level downward. One must ask, for example, if the checking work segments are a good use of student time during math classes.

Since most of the math segments at Level 1 are preparatory or checking work activities, it seems appropriate to conclude that it is the pedagogical nature of these segments which accounts for the cognitive level effect in the teacher-paced math segments. Only a small number of math segments at cognitive Level 1 were recitations and lectures and student attention levels were higher in these segments than in the preparatory and check work activities. Of course, recitations with higher cognitive goals might have higher student engagement.

Recitation Segments

Within a format such as recitation, is it possible to discern cognitive level effects? Table 5.5 contains the average student involvement in recitation segments in the two subjects by cognitive levels. In math there is no difference in average attention to recitations at Levels 1 and 2, but the application segments have a considerably higher mean.

In social studies recitations a very clear effect of cognitive level is evident. Within a question and answer format, the more complex the questions in terms of cognitive level, the higher the student involvement. The finding of a cognitive level effect with the recitations is particularly interesting when it is recalled that overall teacher-paced social studies segments did not show an effect of cognitive level (see Table 5.1). As with the math segments, an examination of the role of format is needed to understand the student response pattern.

In the case of recitations, higher order questions clearly elicit higher average student involvement levels. Teachers tend to ask factual and comprehension questions more frequently than application, analysis or synthesis questions. But when teachers ask questions dealing with research

Table 5.5

Average Student Involvement in Recitation Segments

of Different Cognitive Levels by Subject Matter

	Math			Social Studies		
Cognitive Level	N*	$\bar{X}$ PON	SD PON	N*	$\bar{X}$ PON	SD PON
Receive/Recall Facts	5	77.4	16.9	43	71.1	21.1
Concepts/Skills	135	76.8	15.6	30	72.1	16.3
Research Skills	---	---	---	10	80.5	21.3
Application and Higher Mental Processes	8	86.6	10.5	13	83.1	11.4

*N is the number of segments for which PON estimates are available.

skills or requiring application and other higher mental processes, students respond with more attention than when asked lower order questions. Within the very same format cognitively more complex content elicits higher student attention.

Most prior research has emphasized the extent to which teachers tend to conduct low level recitations and ask questions involving less complex intellectual processes (Gall, 1970; Stano, 1981). The teachers we observed conduct the majority of recitations at the factual or comprehension level also. However, about one-third of the recitations we observed were directed to more complex cognitive processes, suggesting that teachers can ask more complex questions given the proper subject matter. It is particularly noteworthy that children are more involved when in recitations with more complex objectives.

In the analysis of preparatory segments, checking work segments and recitations a common result seems to emerge. Students respond to form but also are highly responsive to content. In particular, more demanding content elicits higher student attention as does material which is really necessary or novel as opposed to highly redundant, repetitive or perfunctory.

The analysis of the role of format in teacher-paced segments has clarified the findings dealing with the relationship between cognitive level and student involvement in math and social studies. Factual (Level 1) segments are pedagogically diverse. In math they are primarily checking work and preparatory segments. In social studies they consist of recitations, preparatory segments and a small number of other formats. The function of the segment in the activity flow has a clear impact on student attention.

Summary and Discussion

Over the last two decades, descriptive studies of elementary instruction have produced quite similar results. School children are seen to experience heavy doses of teacher talk and much low level intellectual activity. Sirotnik (1981) and Goodlad (1984) present a characterization of schools which is very similar to Philip Jackson's (1968). In reporting findings from the large study of schooling just published, they describe pupils in elementary and secondary schools as mostly listening to teacher talk or independently practicing skills in classrooms with "flat, neutral emotional ambiance." Regarding intellectual activity, Goodlad (1984) comments:

> Only rarely did we find evidence to suggest instruction likely to go much beyond mere possession of information to a level of understanding its implications and either applying it or exploring its possible applications. Nor did we see activities likely to arouse students' curiosity or to involve them in seeking solutions to some problem not already laid bare by teacher or textbook.
>
> And it appears that this preoccupation with the lower intellectual processes pervades social studies and science as well. An analysis of topics studied and materials used gives not an impression of students studying human adaptations and explorations but of facts to be learned. (p. 236)

Researchers using process-product designs (Gage, 1978; Rosenshine, 1970) have also conducted descriptive studies, but their emphasis has been on discovering relationships between elements of practice and pupil outcomes so that recommendations for good instructional procedures can be grounded on "hard evidence. The "product" in these studies has been achievement in basic skill subjects in the elementary years. Interestingly, the picture of effective teaching which has emerged from the process-product approach emphasizes teacher direction of learning, independent practice of skills, and low level teacher questions. The direct instructional model is thus fairly consonant with descriptions of current practice although it surely does not applaud sterility.

I have tried to explain why one would arrive at an approximation of current practice through using the process-product approach (see section on The Existential Fallacy in Educational Research). The question of interest here is whether our data are consistent with the picture of schooling in other studies.

Does the data collected in fifth-grade math and social studies classes confirm previous findings? Does our methodology and choice of sample in any way alter the general conclusions others have presented?

Pacing and cognitive level, the key variables examined in this chapter, are central in describing educational settings. There are both consistencies and inconsistencies between our data from fifth grades and other available data. I believe both methodological and substantive factors account for the differences. A major issue, given insufficient attention even in the most recent studies, is the degree to which subject matter and curriculum as well as grade level affect classroom practice.

In the aggregate our data support the finding that teachers tend to dominate instruction. Approximately half the time in both math and social studies classes is teacher paced. Once a teacher is running a segment, it is likely that she or he will do the majority of the talking. More than half of student time under teacher pacing is spent in recitation formats. The rest involves task preparation and giving instructions, checking work, lectures and small amounts of other formats.

Even though teacher-paced segments account for almost equal amounts of student occupancy time in the two subject areas, the overall pacing distribution in the two subjects and work conditions represented in the pacing distribution is dissimilar. Within teacher pacing, the formats used vary by subject matter.

Students do spend a lot of time in teacher-run segments, but other studies suggest higher proportions of time than we found. One reason for this discrepancy is methodological. We recorded information about the activity structure of the classroom accounting for the behavior and location of all the actors. The recording method was not teacher-centered. In contrast, many studies focus on the teacher, deriving a capsule of educational experiences as seen with the teacher at the center. More particularly, observations are often restricted to settings in which teacher-student interaction is occurring. Verbal transactions between teachers and students have been seen as the core of teaching (Brophy and Good, 1974). But instructional environments have more action structures than verbal stand-up teaching.

Using activity structure descriptions may give a more accurate account of student experiences in the classroom. We observed large amounts of student time in independent or child-paced work in math and in a combination of child-paced, mechanically-paced, and cooperatively-paced settings in social studies. In actuality, certain curricular programs operated so that teacher-paced segments might be fairly rare. For example, in individualized math programs children spent almost all of their time working independently at their own rate to attain a sequence of goals. In individualized programs teachers worked with one pupil at a time briefly checking progress and diagnosing difficulties, but teacher-student interactions such as seen in recitations or lectures were not present. Similarly, social studies programs which made consistent use of small work groups had teacher-paced segments which were preparatory but rarely did one see a recitation.

The data show that children in the upper elementary grades spend about half their time in teacher-led activity segments. In math the other half of

their time is spent in seatwork. Generally the skill areas such as mathematics and language arts are structured so that considerable in-class time is provided for children to practice skills and do assignments. Many elementary school children are no longer expected to do homework regularly so that school time is often allotted. Schools in which children may be expected to do some homework nevertheless provide time for children to "get started" during school hours.

In social studies when children are not under teacher direction they either work individually, work in small groups, or occasionally watch films or listen to tapes. We only estimate about 13 percent of student time is spent in cooperative work groups. In some classrooms the figure is much higher, while some children never participate in small groups. Sands (1981) found science and home economics classes contained children working together, often for the purpose of sharing apparatus. Social studies, science, and other laboratory subjects have more frequent use of small groups than such subjects as math, reading and language arts. Sirotnik (1981) reporting data from 129 elementary school classes selected to represent varying community types found fewer than seven percent of the students were in small groups and only two percent of students were actually observed in cooperative groups.

To summarize, our results suggest that the estimates of time spent in teacher-paced instruction may be too large in other studies. Surely teachers do direct instruction a lot of the time, but more student time is spent in seatwork and skill practice in the basic subjects than has been estimated and somewhat more diversity of practice occurs in enrichment fields when they are taught. The upper elementary grades probably have

more subjects taught than the primary grades where an extremely large proportion of the day is spent on language arts (e.g., Barr and Dreeben, in press). Our results are consistent with very low frequencies of cooperative work, but subject matter variation needs more recognition.

In both subjects studied, student involvement was highest under cooperative pacing. Teacher pacing is not necessarily the most effective way to engage upper elementary students. The data do not replicate results from the lower grades such as those of Gump (1967) or Grannis (1978) nor are they consistent with the direct instruction model (Rosenshine, 1976). Cooperative group work was not identified in the studies mentioned and probably occurs rarely in the primary grades. The lesser maturity of the children also may explain why direct teacher supervision is associated with the highest involvement levels in the primary years.

The other key variable examined in this chapter was the cognitive level of segments. What are the main conclusions and how do our data compare with those from other recent studies?

Cognitive level was not coded in a finely tuned manner. The intellectual process which appeared to embody the predominant instructional goal of the segment was coded. A modification of the levels described in the Taxonomy of Educational Objectives, supplemented by categories dealing with research skills was used. A hierarchy of complexity can be formed with the categories.

An important finding was that the conditions under which children address different cognitive goals varies. By focussing on cognitive level in all segments, not just teacher-student verbal exchanges, a somewhat more varied picture of the intellectual experiences of children emerges than in

other recent studies. Both methodological and substantive factors likely account for the differences.

The very global finding that classroom instruction is frequently geared to lower level intellectual processes and convergent thinking is confirmed by our data. However, considerable variation was found by subject matter and this conclusion might be altered, depending on the definition of lower mental processes chosen.

One very common definition of lower level instruction is that geared to a factual or knowledge level alone. Using that criterion, only 17 percent of the math and 33 percent of the social studies segments are low level. On the other hand, if one divides cognitive processes into lower and higher categories by including both knowledge (Level 1) and comprehension or translation (Level 2) as lower level, and application (Level 3) and upward as higher level, the majority of instructional segments were lower level. Math segments are primarily at Level 2, and only three percent were application. About three-fifths of the social studies segments would be lower level according to this split. While the majority of segments in both subjects are lower level according to this criterion, subject matter does make an appreciable difference as does the particular curriculum in social studies.

Prior studies have not distinguished the conditions under which children work on different cognitive goals. Our data show that teacher-led segments are the least intellectually complex, child-paced segments are somewhat more challenging intellectually, and settings in which children work cooperatively tend to have the most complex cognitive goals. This trend must be better understood and recognized in analyzing the school experiences of children. The picture is reasonably consistent with the recent descriptive study of Goodlad (1984) with regard to teacher-led instruction.

However, insufficient attention to the lone activities of children and work in cooperative groups has tended to somewhat overemphasize the intellectual paucity of the child's experience in school.

Why the cognitive level varies with pacing condition is a fascinating question which needs more exploration. Why do teachers select and utilize certain instructional arrangements for different cognitive goals? Must it be so? There are sound arguments which can be made to condone the use of small groups for complex intellectual goals, it is less clear what forces tend to influence the teacher to direct so many low level segments. One factor which arose in the analysis of formats at the lowest cognitive level, is that many of the segments teachers direct at the factual level consist of checking work or giving brief instructions in mathematics. In social studies task preparation and giving instructions account for about 40 percent of lowest level segments, but another third are recitations.

Checking work segments can be viewed as a poor use of time from the student's point of view except insofar as they provide needed reinforcement and feedback to pupils. More observation would be needed to ascertain the actual value of such activities. The value for teachers is clearer. A chore which must be done gets accomplished and the teacher may obtain a fairly clear idea of student progress. In any case, having students check work cuts down on the more clerical aspects of the teaching job.

Task preparation and giving instructions seem a needed part of the instructional segment flow. The only question is whether these segments, particularly in math classes, could be handled more efficiently since students do not seem to need most of the information being transmitted.

The recitation is usually characterized as a low level activity and efforts have been made to improve the types of questions teachers ask (Stano,

1981). The data we collected on recitations in math shows that almost all are at Taxonomy Level 2, but a few application segments occur. In social studies, factual questions represent the most frequent type of recitation segment, but more than half the segments are at Level 2 or above. (Some teachers some of the time lead recitations addressed to higher mental processes, application and research skills. A closer examination of the curricular contexts which support high level recitations seems warranted.

Perhaps the most striking finding in the data set is the completely consistent relationship between student involvement and cognitive complexity. The relationship is found in both math and social studies. As cognitive complexity increases, children's average involvement increases. The relationship also is present within recitation segments alone, particularly if one compares higher versus lower mental processes as previously defined. Similarly group work segments show a clear increase in student attention when higher mental processes are the goal.

In contradiction to the direct instruction model, our data show that children do respond to challenging tasks, particularly in a groupwork context but also under teacher direction such as in the classic recitation setting. It is not my intent to prescribe educational practice because our correlational data look different from that of others. However, the data do show that children in classrooms with varying curricula respond with added attention and interest to cognitively complex tasks and activities. This result might encourage more experimentation with curricula that embody complexity. At least the data should raise questions about the generalizability of early findings which formed the base for the direct instruction model.

Because our data set was somewhat more diverse in subject matter than the prior studies which were limited to basic skills, a pattern of relationship between cognitive complexity and student involvement could be revealed. As in any descriptive study, if the classrooms do not contain diverse educational practices, it is not possible to study relationships across a broad spectrum of approaches. The social studies classes did contain sufficient range of cognitive processes to demonstrate a very clear positive association between complexity and student involvement. To the extent that such variation was present in math, higher involvement was also found in more cognitively complex math segments.

The children in the classes we studied came from a relatively broad range of backgrounds and possessed diverse abilities. While there are some confounds at the class level between the educational level of the parents and curricular choice (see Thomas and Kemmerer, 1983) the clear pattern of high involvement and cognitive complexity cannot be explained as a socio-economic effect. Evidently the children we studied in the aggregate would agree with Danny that heaven is challenge. At least at a behavioral level they respond to challenge with more interest than they do to the mundane. Can we raise our sights to meet their response?

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Chapter 6

CONCLUSION

Relevant discussion has been provided in each chapter of this Report. Here I want to highlight some accomplishments and indicate future directions for research. Implications of some of the findings will also be discussed.

The activity structure approach has yielded a picture of classroom life which is assimilable at both a practical and theoretical level. The methodology of direct observation and qualitative analysis of activity segments has preserved the organized character of instruction while permitting some simplication for purposes of analysis.

In this research I have assumed that the study of teaching is the study of human action and interaction. Human action and interaction are situation-bound. A knowledge of context and/or setting is essential for an understanding of human action. The ecological approach was adopted in order to capture information about purpose, human behavior and setting properties as they unfold together in classrooms. Rather than view instruction as composed of discrete behaviors, I have attempted to capture behavioral patterns and routines at a more molar level.

What are elementary school classes like today?

In Chapter 3, I discussed the problem of representativeness and generalizability in classroom research. While large survey studies have been conducted, there are barriers to collecting detailed observational information on large numbers of classrooms. While any conclusions drawn from our data set will have limits on generalizability, the districts studied were demographically diverse and included a range of school and community types. The characteristics of the districts and schools in the sample are known.

Our observations of math and social studies classes show school experience is not the same all day long. Within contexts, such as subject matter and lesson parts, familiar routines and behavior patterns are enacted. But the activity structures used in different contexts are not identical.

Many descriptive studies of schooling have overlooked or glossed the internal variety children may experience in a day or a week in school. The fact that variety occurs, and an understanding of its origins deserves more attention. In this study, subject matter, and to some degree curricular program, have been shown to be sources of differing classroom arrangements.

To find variety in school experiences is not to assert that schooling is composed of highs and lows, rapid changes and excitement. Much of what we saw in schools was rather bland and well regulated. But to expect otherwise, except now and then, may be to misunderstand some basic institutional verities. Routines are routine, but they need not be boring or mindless. Many critics of education do not stop to make these kinds of distinctions.

In Chapter 4, I presented a detailed picture of the subject matter differences in activity structures. If these findings generalize to basic and enrichment subjects more generally a pattern of less uniformity of practice can be expected in enrichment fields. Overall, the basic areas like math seem to have a more limited number of approaches to instruction and more similarity in topical coverage from school to school.

One can expect more commonality of experience in basic subjects for students from a variety of school settings. Also, any group of pupils in a given math class, for instance, will experience a fairly small number of instructional practices. These expectations of similar experiences, however, are only valid to a certain point. Other researchers have demonstrated differences in the content of textbooks in math (Freeman et al., 1980). Differences in reading instruction also exist (Chall, 1967).

Instruction in the basic subjects seems to have a number of properties worth noting. First of all, more time is allocated more consistently to basic than enrichment subjects. Similarly, the time spent on basic subjects is likely to be "prime" time -- the morning when children are fresh and thought most ready to learn.

Instruction in basic subjects seems to carry more of a mandate for individual accomplishment and mastery. In this sense, more pressure is placed on both teachers and students to learn the basic subjects. In part this stance is translated into testing practices wherein most elementary pupils only take standardized achievement tests in language and math. Individualization, remedial programs, and programs for enrichment or gifted and talented students all occur more frequently in basic areas. Such programs are responses to the need for individual mastery and learning and occasionally use computers and other manipulative approaches.

The basic subjects seem to utilize fewer forms in instructional settings. Less variety in student and teacher behavior as well as cognitive goals was evident in the math activity segments. From this point of view, individual children might come to expect their daily experiences in math to be highly predictable at the level of the activity structures in use, including the nature of the materials. The textbook-workbook world of the classroom is no more evident than in math classes.

Because enrichment subjects generally are seen as more optional, they are characteristically more diverse in almost all the respects mentioned. Enrichment subjects, as exemplified in the social studies data, are less similar in topical coverage from class to class and school to school. The activity structures and instructional approaches are more varied both across schools and in any given class. The goals and purposes cover a broader range

of intellectual processes than found in the skill-oriented subjects. Time allocations are also more variable than in the basic subjects and on the average less time is spent on enrichment fields.

In a somewhat ironic situation, the arrangements observed in the two subjects suggest that long-standing progressive ideals for "good" education are more often present in social studies than in math. The basic subjects are approached with a restricted cognitive range, with little if any concrete or manipulative experiences for children, with little if any use of peer interaction, and no student options in learning. Most social studies classes include more cognitively complex goals, sometimes make extensive use of peer learning, and provide more diverse materials and experiences for pupils. However, even in enrichment areas few activity options are available to pupils beyond the possible choice of a topic in an otherwise prescribed project or assignment.

The irony of the situation is that teachers experience less choice and professional autonomy in the basic areas but are held more accountable for student performance in these domains. Actually it may be more accurate to say that teachers have fewer options in the basic subjects in part because of greater accountability pressure. They may also believe that the sequentiality and structure of basic subjects requires a more fixed approach, resulting in the more homogeneous picture we observed.

Children may experience fewer different routes for learning in the basic areas but also more pressure for performance. In some respects, the social studies classes seemed to provide more basis for autonomy in learning and learning to learn skills for pupils than did the math classes.

As part of the analysis of feedback, textbooks and other materials used by students in the math and social studies classes were examined. With

the exception of some of the individualized math programs, a clear result emerged. Math texts at this grade level must be used in conjunction with teacher instruction and explanation. The textbooks contain limited examples and very little in the way of explanatory text. A child who needs to learn a principle or new algorithm would be unlikely to succeed using the math text alone. The assumption is made that the teacher will present new math material and explain how to do problems. If this analysis is accurate, children will expect that math requires explanation from an "expert" and cannot be learned on one's own.

While teachers seem to have almost exclusive responsibility for introducing new material in math, a different situation obtains in social studies. Pupils explicitly learn a range of research skills which allow them to locate information and read maps and other graphic materials. Because discursive texts are a more integral part of social studies classes, children read for information and to learn new concepts and ideas.

Our observations suggest considerable range in the degree of success experienced by pupils in mastering research skills and other abilities which might facilitate independent learning. Students are often guided with questions prior to using discursive materials or are questioned after reading. Our impression in many classrooms was that fifth graders were being exposed to skills which would help them learn independently, but were not always very adept in their use. Looked at as long-term goals, this situation is not surprising. Even though the mastery of these research skills may have been limited, one might assume that children would think of themselves as capable of pursuing a new idea or line of investigation in social studies whereas this would be less likely in math. Interviews with pupils and

teachers about their perceptions of the learning process in the two subjects would directly assay the existence of differing ideas about learning in these fields.

In the Introduction I showed that participation in varying instructional arrangements could influence the way in which students viewed the meaning of learning. The necessity for adult explanation as distinct from possible autonomous learning might be a dimension along which meanings differ. I speculate that math phobias, so common in adults, may have their origins in classroom practices which make the novice math learner highly dependent on adult explanation in new learning.

While it is possible to draw a general picture of the school days of children, the fact that different programs of instruction are enacted with diverse activity structures must be remembered. In both subject areas, groups of classes could be identified as following similar curricular approache and the classes within a curricular approach were more alike. For example, individualized math programs were accomplished by children working on their own through a definite sequence of learning objectives. The children took periodic tests which either verified an adequte level of mastery of a given objective and sent them on to the next one or directed them to further practice. In social studies, courses of study which emphasized history and geography tended to be taught in a more "traditional" manner with whole class recitations and reliance on textbooks.

More study of curricular approaches, their commonalities and differences is needed. Certain programs seem to require a particular activity structure. For instance, MACOS was designed for use with small group problem solving. Individualized math programs required testing and individually-paced practice and seatwork. Other programs may be taught with a variety of methods, dependent more on the teacher's preferences and training.

A very central question concerns the extent to which certain goals require certain educational means. In the analysis of cognitive goals and pacing, a pattern showing some strong co-occurances between pacing and cognitive level was found. It should be recalled that activity directed toward higher mental processes tended to occur much more frequently in social studies when children were working together and much less frequently under teacher direction. In both subjects, teacher-paced segments had the highest proportion of factual activity.

The fact that this distribution is currently found in no way implies that these arrangements are there by necessity. But factors which tend to produce such patterns of instructional arrangements must be understood much better. Is it the nature of the subject matter itself and the instructional design which creates these differences in the settings for different goals? Are teachers lacking in skills to ask higher mental process questions and convey information at more complex levels? Are there procedural requirements in on-going settings which are typically handled by the teacher in rituals at relatively low levels? Are there alternatives to the current arrangements?

One possible approach to addressing these issues would be more careful examination of curricular practice in order to see the range of settings used for any given topic or unit. Such analysis could begin with the data in hand and be extended to other educational settings. The theoretical work of Grannis (1975) suggests that certain settings are optimal for certain goals. He examined the goals of community, competence and individuation. Similar analyses might be conducted for different intellectual and social processes. Rather than asking if there are better or worse methods in toto, a more precise question about the match between instruction for a particular goal would be formulated. Perhaps Doyle's (1977) view of classroom activity

as a performance for grade exchange would be an additional helpful starting point.

Specific forces within communities and school districts might also be examined more carefully for their impact on classroom practice. I did not find a clear connection between the SES of a school district and classroom activity structures. However, my colleagues (Thomas & Kemmerer, 1983) did show a relationship between differentiation in math classes and SES. Further examination of related questions is in order.

While I have been emphasizing the diversity of instructional arrangements, one might also focus on the relatively few setting configurations used in classrooms. Compared to logically possible arrangements of setting variables, the actual combinations are very few in number. More insight into why teachers rely on such a limited set of instructional forms is needed. Westbury (1978) has discussed this issue in a cogent review of classroom process research.

Educational Alternatives

Considering alternative educational practice may be more a question of values than one of science. Even a demonstration of some empirical relationships between given educational practices in a given setting and some specified outcomes such as achievement data does not necessarily suggest that others should imitate the practices. In the section on the existential fallacy in education research I discussed some of these issues.

The data collected in this study are limited in their utility for addressing educational outcomes because we do not have achievement data to measure instructional outcomes. The reasons for this lack were also presented in Chapter 3. Only a proximal measure of student response to instructional segments is available in the assessment of student involvement.

Two setting conditions were found to be associated with higher levels of student involvement in segments in both subjects. A highly regular linear pattern was found between increasing cognitive complexity and increasing levels of student involvement. Across pacing conditions, children were most involved when working together.

Some thought might be given to these empirical findings in light of values regarding "ideal" educational practices. Clearly not all instruction should be cognitively complex or carried out in small peer work groups. However, current practice is so far from dominated by these activities that more emphasis might be effectively placed in these areas. The findings simply support the idea that children will respond positively to such arrangements. The findings suggest some important limits to prescriptions for direct instruction and similar pedagogy which emphasize lower mental processes and teacher direction of instruction. Since those prescriptions are made empirically, these empirical data must be considered by researchers who work on that basis.

I have argued that the descriptive findings, though important, are not the only grounds on which one should think about educational alternatives. The quality of life for children during school also should be considered. We tend to focus most of our energy on providing school environments with future goals in mind. But the on-going experience of children in schools should also concern us. Positive student response to cognitive challenge and to the chance to work with friends and peers indicates some of the activities which children themselves find engaging. While involvement cannot be the only way to judge a good school experience children's reactions and perceptions of school in the here and now might occupy more of our thoughts about school settings.

It might also be salutory to question teachers about their apparent reluctance to give pupils options in learning. The almost total lack of choice given pupils with regard to what to learn and how to learn and when to learn is a striking result of this study.

Some Implications

The research design deliberately included observations of teachers and students in two subject areas. A strong finding in the data, expanded in a recent paper (Stodolsky, in press), is the extent to which individual teachers vary the instructional arrangements they use as a function of subject matter. Student involvement, measured in the classes of the same teacher teaching the same students two different subject matters, has been found to be completely uncorrelated. Teachers often produce discrepant attention levels in students when teaching different subjects. Teachers are not arranging instructional environments which consistently produce highly involved or less involved children.

An important implication of these findings lies in the area of teacher evaluation. Elementary school teachers are often evaluated for both summative and formative purposes by direct observation. Since teachers' behavior varies systematically by context, in order to be fair and generalizable, observations would have to be extensive. Current evaluation practice typically involves at most two or three short observations without regard to the subject being taught. Current evaluation procedures assume that samples of teaching behavior will be roughly equivalent, an assumption which is strongly contradicted by our data.

More analysis and research is needed to better understand the contextual variables of most importance for evaluating elementary school teachers.

In the meantime, the basic validity and fairness of many teacher evaluation practices must be questioned, particularly when employment decisions are involved.

In the realm of teacher training, a primary implication of the research is the recognition by teacher educators and teachers themselves that they possess a more diverse repertoire of teaching skill than is ordinarily assumed. A teacher might ask, "Why do I use this activity structure for this instructional purpose?" "What are my assumptions about the way to teach math, reading, science and social studies?"

It is often suggested that teachers visit "a classroom across the hall" with the hope of exposure to new practices and ideas. I would suggest that a teacher "visit" with herself or himself in two teaching contexts. Teachers often have the skills and abilities to create very different classroom ecologies. Teachers and teacher educators must try to sort out the necessary in teaching from the traditional -- the habitual from the possible.

Future Research

A number of promising lines for research have been suggested by the current findings. More should be known about the causes of different instructional arrangements. Given the finding of subject matter differences, a number of intriguing possibilities might be pursued.

I have already suggested a careful analysis of some key properties of the subject matters. Particular attention might be paid to the nature of knowledge in each field and to the sequential structure, if any, of the discipline.

To what extent are the subject matter differences in classroom activity structures a direct result of the specific training which teachers receive?

What exactly do methods courses in preservice programs convey to future teachers about pedagogy in different subject fields? Since subject specialists often provide the training for elementary teachers in each field separately, it may be that recommendations for different types of pedagogy are not even explicitly recognized.

A systematic examination of teacher's manuals which accompany textbooks might prove illuminating. The particular focus would be on recommendations for instructional arrangements proferred in the manuals. For example, what recommendations are made for grouping of students or for assessment of pupil progress? What is assumed about the order of content coverage? What instructional formats are suggested?

Eskreis (1983) did a preliminary analysis of this type including the reading, math, science, and social studies programs of one district at the kindergarten level. He found that both the science and social studies teachers' guides emphasized capitalizing on opportunities to introduce concepts and units without regard to order. Teachers were also urged to use their imagination in devising ways to provide relevant instruction. On the other hand, an explicit text for the teacher was provided with the reading program and teachers were urged to say exactly what was in the manual to the children during instructional periods. The order of the material was considered fixed and it was assumed that teachers would not rearrange units of instruction. In math, teachers were also provided with actual verbalizations which could be used in connection with each lesson. Order of presentation was specified and test materials were provided for each unit.

The fascinating thing about the Eskreis analysis is that the materials were all selected for use in a given suburban district. The subject matter differences found were obviously considered appropriate given the overall

philosophy of the district. Analyses of this type should be pursued at a variety of grade levels.

A feature of the research design was the inclusion, whenever possible, of two teachers within the same school. A motive for this was to assess the extent to which practice was more similar within a school or school district than between schools. Only preliminary answers are available to this question as it is actually a very complicated one.

In what way would one effectively index similarity of practice? One possibility would be to use the various activity segment features that were coded and to assess the extent to which values on the variables were similar. For example, one could look at the occupancy time distribution in a given class relative to instructional format or pacing or cognitive level and ask if the distribution was similar to that of the teacher across the hall.

Another possibility would be to examine the materials in use and call classes similar if the same curricular program had been adopted in both settings, regardless of the program's implementation. Student response to instruction might provide a third window through which to assess similarity of instruction.

A somewhat cursory assessment of the data shows that similarity of practice obtains in some schools and not others and that classes are similar on some but not necessarily all criteria suggested. Ferguson (in preparation) in her doctoral research using our data base, has found that certain schools delegate authority to teachers with regard to grouping and curricular practices, others lodge most control over such matters with the principal. These differences in administrative practice may relate to differing classroom arrangements.

Another feature of the data set which we have not exploited fully is the consecutive observations of instruction in each classroom. Future effort could be directed toward assessing the type of continuity found in instructional sequences in different classrooms. Also, the extent to which student involvement is affected by variety or continuity of instruction might be studied.

In the Introduction I emphasized the importance of understanding both the causes and consequences of instructional arrangements. Except for assessing student involvement, the current research does not contain evidence about how instructional settings influence students and teachers. The instructional configurations documented highlight the need for future inquiry in that direction.

I have argued that daily, repetitive experiences leave traces both in terms of learning methods for functioning within the particular activity structures and tasks, and in the realm of attitudes, expectations, and perceptions. To this point such an argument is speculative; substantiation requires further research.

Interviews with both students and teachers would seem the most promising approach to obtaining information about the impact of instructional arrangements. Discovering if students have internalized differing ideas about what it means to learn various subject matters would be particularly interesting. Finding out if students exposed to different types of instructional approaches have different ideas about learning is also important.

Do students who learn math in an individualized program have different perceptions and attitudes toward mathematics and themselves as learners of math than students who experience whole class teacher-dominated instruction? How would students in these differing programs describe the nature

of mathematical knowledge? Do students in individualized programs develop more autonomy in learning? Would work skills developed in an individualized math program generalize to other learning settings?

What consequences arise from differing approaches to social studies instruction? Do children in peer work groups actually develop skills in interpersonal problem solving? How do attitudes toward competition and cooperation emerge in such settings? Experimental studies (Slavin, 1980) suggest increased interpersonal attraction and positive attitudes arise under certain group work arrangements.

More generally, how do children's perceptions of others and themselves vary as a function of different learning environments? In environments in which less public evaluation is present, do children make friendship choices on other than achievement grounds, as was found by Bossert (1979)? Do interpersonal perceptions vary from subject to subject for children or is a general halo effect in operation?

Are some subjects seen as difficult and others easy as a function of the form of instruction and the task demands? If found, do such perceptual differences arise primarily from variation in settings or do they interact with individual child characteristics? Much previous research effort has involved finding interactions or matches between children with certain aptitudes and abilities and certain educational approaches. Perhaps the ways in which children function within given task structures and the implicit consequences of those learning arrangements, would be another way to think about the child-environment interaction problem. Berliner (1983) has recently made a similar suggestion.

The effects of settings on teachers is also worthy of systematic attention. Working within a particular type of activity structure, one has

the opportunity to observe some features of children and their learning more than others. Standards of acceptable behavior and strengths and weaknesses in children will be perceived in terms of the particular program in operation. Teachers' skills and abilities will also be utilized to different degrees depending on the instructional program they use.

How much are teachers aware of the extent to which the environments they create both limit and extend opportunities for learning? Do they see children as fairly consistent across learning and other environments or do they recognize the ways in which their classroom shapes and selects certain behaviors? Teachers' views of learning in differing subject areas and with respect to other contextual variables is also of interest.

Other reserach avenues have been suggested throughout this Report. Both methodological and substantive questions have arisen as a result of these efforts. Some substantial progress has been made in describing classroom activity. It is hoped that future research can build on this base.

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Appendix A
SAMPLE INSTRUMENTS

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

Teacher ____________________

Class code ____________________

Day ____________________

Segment ID ____________________
(2 digits for district, 1 digit for classroom, 2 digits for segment)

Is segment simultaneous? yes no

Time __________ to __________

# of students in segment __________

Format ____________________

CLASS CODE: #32

OBSERVER: Jane Pithal

CO-OBSERVER: L. Castaneda

SUBJECT AREA: Math

M T W TH (F)

DATE: 2/9/79

NUMBER OF ADULTS:

Teacher(s): 1

Teacher aide: ___

Student teacher: ___

Other (specify): ___

NUMBER OF STUDENTS: 16

NUMBER OF BOYS: 12

NUMBER OF GIRLS: 4

For office use only:

JAT: ___

SS: ___

TF: ✓

FK: X need segments on stud. obs.

DM: ✓

OBS: ___

Cleared 2/28

INFORMATION ON BLACKBOARD(S):

(Yesterday's language arts assignment was still on the board. Should be recorded on Rosalba's activity structures for 2/8/79.)

MISCELLANEOUS COMMENTS:

Several students are absent. One student (not one of ours) has been diagnosed as having infectious mono. Students were given sheets to take home today which describe the disease. No explanation is sent along with the description to indicate why it is being sent home.

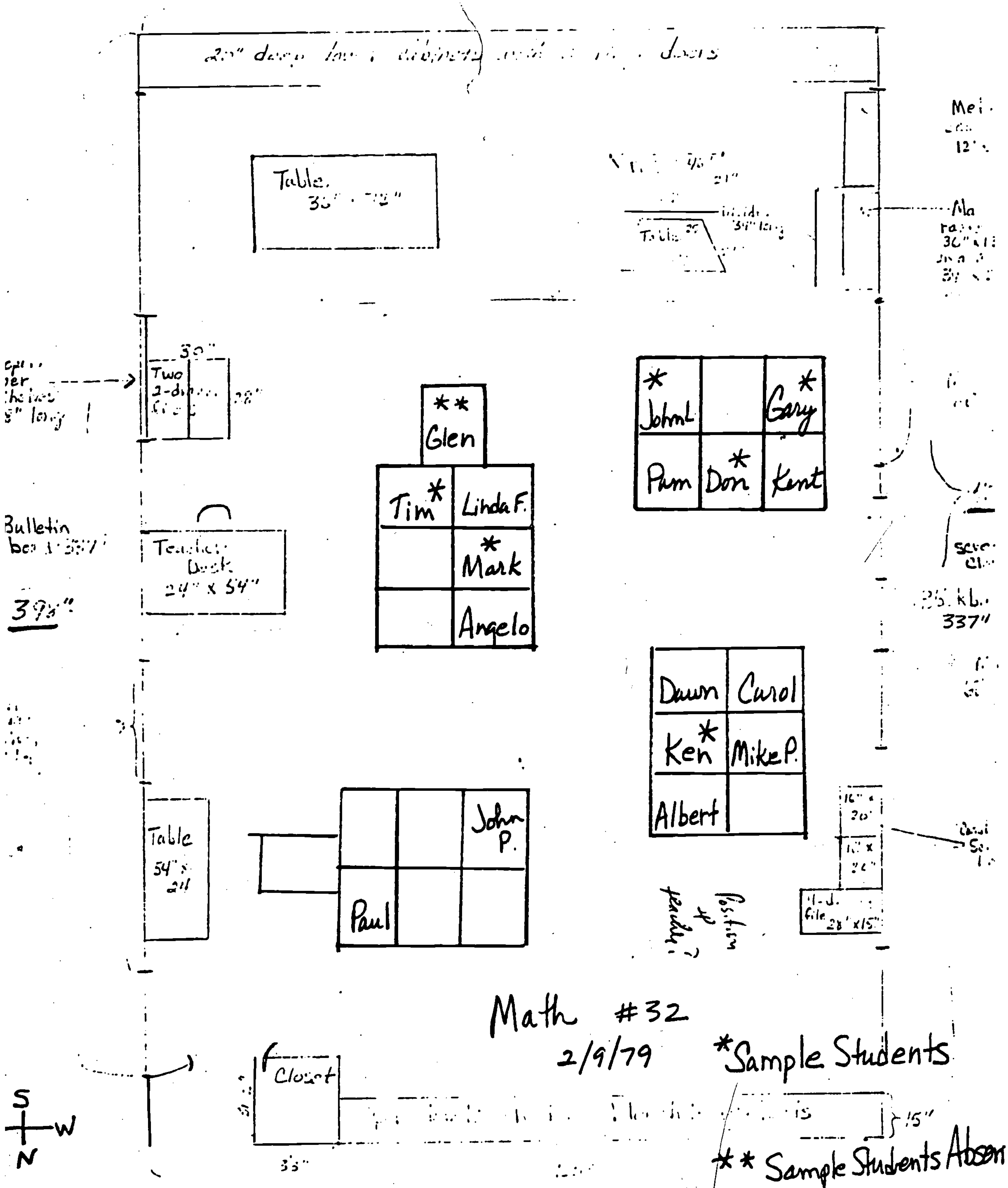
The teacher's car was hit this morning on her way to work. Dented door. She said she has a headache.

-201-

221

222

Registered 2/12/79



[redacted] Classroom

A-activity SA-simul.act SWP-sweep TIME/CODE	pg #; lesson # area/focus in math, SS, etc. CONTENT & INSTRUC. FORMAT	DESCRIBE ADULTS' ACTIVITY AND LOCATION	PRESCRIBED MATERIAL RESOURCES	ADDITIONAL RES. USED BY TEACHER
A1 1:04 – 1:25	Recitation Math – equivalent fractions Teacher-made ditto #1 attached Going over problems done yesterday but more of a recitation than a checking of homework	location: Standing at the blackboard Leads the students through the equivalent fractions problems on the dittoed sheet. Students had done these problems yesterday but teacher was giving additional or repeat instruction on how to calculate equivalent fractions. The teacher reads a problem, asks for an answer, asks how the answer was arrived at, often goes through the process of calculating equivalents, often writes fractions on blackboard & shows calculation, often asks how many got the correct answer & how many did not. Clarifies by restating process. "How did you get from 1/4 to 6/24?" "What did you do?" Writes on board: $\frac{4}{16} = \frac{1}{4}\left(\frac{\times 4}{\times 4}\right)$ "How many did not get 4 for an answer? Raise your hand. Do you see what we did?" "How are you getting 7?" $\frac{1}{\square} = \frac{5}{35}$ "Do you see what you did wrong?"	Ditto: "Equivalent Fractions" #1 attached [illegible] made ditto pencils	teacher uses blackboard & chalk
A2 1:26 – 1:39	Recitation Math – reducing fractions to lowest terms	location: Standing at blackboard Leads students through exercise on reducing fractions to lowest terms. Starts by having students reducing a whole number to a set of factors: Writes on board: 28 → 7 · 4 → 2 · 2; 7·2·2 "Is 7 prime?" "Is 4 prime?" "Now we will do the same thing with fractions – finding the largest one number we can divide both numbers by." Writes on board: $\frac{6}{8} = \boxed{\frac{3}{4}}$ $\frac{12}{15} = \boxed{\frac{4}{5}}$ "All right, try these 4 on the back side of your pages." Writes on board: $\frac{20}{25}$ $\frac{11}{22}$ $\frac{10}{30}$ $\frac{15}{78}$ Teacher makes up problems ✓ Asks students for answers to problems. Asks if anyone did not understand. Tim said he did not. Between 1:34 – 1:37, teacher goes through problems, helping Tim in numbers you can divide 20 (e.g.) by. Also asks other students [illegible] answers.	students use back side of #1 to write problems on. Pencils	Teacher uses blackboard & chalk

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N & LOCATION OF STUDENTS	STUDENTS' ACTIVITIES DURING TASK	SPECIFY OPTIONS FOR STUDENTS	SPECIFY ANY S INPUT INTO OPTIONS/STRUCTURE OF ACTIVITY
N 15 Sitting at their desks (see attached map)	Following along as the teacher leads them through equivalent fractions on ditto. Checking to see if their answers are correct, sometimes making changes on ditto, raising hands in response to teacher questions, orally giving answers when called upon by teacher.	None.	
N 16 Sitting at seats (map)	Listening to teacher talk about how to reduce fractions to lowest terms. Raising hands in response to her questions, orally responding when called upon, doing (writing) four problems given by teacher.	None	

A-activity SA-simul.act SWP-sweep TIME/CODE	pg #; lesson # area/focus in math,SS, etc. CONTENT & IN- STRUC. FORMAT	DESCRIBE ADULTS' ACTIVITY AND LOCATION	PRESCRIBED MATERIAL RESOURCES	ADDITIONAL RES. USED BY TEACHER
A3 1:40– 1:54	~~Individual~~ Seatwork Math – – equivalent fractions – reducing fractions to lowest terms Teacher-made ditto #2 attached	location: Walking around students Passes out worksheet (#2). Tells students that the top half of the sheet has equivalent fractions problems & that the bottom half has problems asking them to reduce fractions to lowest terms. Tells them what some numbers are on right side of ditto – numbers that did not come through clearly on the ditto. Walks around students looking at students' work and stopping to answer questions of students who raise their hands. A couple times, she makes statement to the whole class: "In reducing to lowest terms, 3 fractions you have are as low as you can make them." After helping with student: "For a number ending in 5 or 0, what can you always divide by?" "Numbers ending in 2, 4, 6, 8?" Tells students what to switch papers & what to have ready Tuesday (no school Monday). "We check over Tuesday. Plus have Division C ready."	Worksheet #2 (attached) pencils	Division C assignment was given earlier in week. #3 attached ✓
		location:		

1:55 Transition: Teacher says, "Okay. Line up. Make sure this is finished. Have Division C ready."

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N & LOCATION OF STUDENTS	STUDENTS' ACTIVITIES DURING TASK	SPECIFY OPTIONS FOR STUDENTS / SPECIFY ANY S INPUT INTO OPTIONS/STRUCTURE OF ACTIVITY
N 16 Sitting at their desks (map)	Individually and silently working (writing) the problems on worksheet #2 (attached). Raising hands to ask for teacher help.	At 1:49, Albert hands his paper to teacher. She tells him to keep it. He reads pocketbook from then on
N		

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TIME	STUDENT	ON	OFF	?	CODE	DESCRIPTION OF ACTIVITIES, MATERIALS ETC.	LOCATION/GROUP/GROUP SIZE
10:5	1. Gary	X			on	Pencil in mouth - listens to an answer from another student.	at desk W.G. T
	2. Tim	X			on	Looks at teacher at board, writes down/on sheets the equations	" "
	3. Glen				—	out - absent	
	4. John	X			on	Chewing pencil eraser. looks at Teacher. listens	" "
	5. Mark		X		WS off / S off	Talks to Angelo at his left while teacher is at desk in unexpected event interruption	" "
	6. Ken	X			on	head down writes on page the fractions	
	7. Jim	Missed			—	~~Absent~~ present but did not see him | seated in a different seat than the regular one because of teacher's change	
	8. —				—		
	1. Gary	X			on	raises hand to answer - listens to other's answer.	" "
	2. Tim	X			on	pencil in hand. listens to teacher looks at board	" "
	3. Glen	-			—	out - absent	
	4. John	X			on	moves head, looks at board, listens to teacher's questions	" "
	5. Mark		X		off	distracted playing with pencil on desk. daydreaming.	" "
	6. Ken			?		Can't see - A ~~child~~ girl is standing at his desk	" "
11:?	7. Jim	Missed			-	~~Absent~~ present but did not see him | seated at a different desk than the regular one - because of teacher's change.	
	8. —				-		

A1

Recitation on eq. Frac

Math

11	Q.1:1:5 Gary	X				on	rises hand waits, shows discouragement/listens	at desk w. group.
	Q.2:1:5 Tim	X				on	looks at board listens to teacher rises hand.	" "
11	Q.3:1:5 Glen	–				–	out - absent	
	Q.4:1:5 John	X				on	moves on seat, looks at teacher and at Angelo who answers a question.	" "
	Q.3/3/5 Mark		X			off	playing with sheet of paper blows it turned/down to desk	" "
	Q.6/3/5 Ken	X				on	writes down the fractions on paper. listens	" "
	Q.7:1:5 Don	Musical				–	~~absent~~ was present did not see him	
Break	8. —					–		
118	1:1:5 Gary	X				on	rises hand waits holds elbow with the other hand.	" "
	2:1:5 Tim		X			off	seems sleepy, looks at pencil on hand, plays with it.	" "
	3:1:5 Glen	–				–	out - absent	
	4:1:5 John	X				on	writes a check mark on one of the exercises on paper	" "
	5:1:5 Mark	X				on	checks exercise on paper/ turned back around to teacher	" "
	6:1:5 Ken	X				on	looks at paper listens to teacher	" "
	Don	Musical				–	~~absent~~ present did not see him	
	8. —					–		

TIME	STUDENT	ON	OFF	?	CODE	DESCRIPTION OF ACTIVITIES, MATERIALS ETC.	LOCATION/GROUP/GROUP SIZE
12'	1. Gary	X			on	rises hand. waits, lowers it.	at desk. w.group
	2. Tim	X			on	looks at teacher and at board - listens	" "
12'	3. Glen	-			-	absent	" "
	4. John	X			on	listens to another student's answer. looks at paper	" "
12'	5. Mark		X		off	Keeps playing with pencil on hands. says something to boy	" "
	6. Ken	X			on	writes down on paper	" "
	7. Don	X			on	writes down on paper.	" "
	8. —				—		
12'	1. Gary	X			on	rises hand. waits listens	" "
	2. Tim	X			on	pencil on hand - looks at paper. listens	" "
7'	3. Glen	-			—	absent	
	4. John			?		Teacher/reprimands him from board/ calls his name. / tells him to pay attention. listening to her	" "
	5. Mark	X			on	Turned to board, listens, looks at teacher	" "
	6. Ken	X			on	looks at board, listens to teacher	" "
	7. Don	X			on	looks at board listens to teacher - turned to the board.	" "
	8. —						

Recitation on eq. fr. A1

reducing fractions A2

break

TIME	STUDENT	ON	OFF	?	CODE	DESCRIPTION OF ACTIVITIES, MATERIALS ETC.	LOCATION/GROUP/GROUP SIZE
12	1. Greg	X			m	writes down on paper, looks at board, listens.	at desk - whole group
	2. Tim	X			m	write, thinks, raises hand to answer (a to get some help.)	" "
1:30	3. Glen	-			—	absent	
	4. John	X			m	raises hand waits, hand up.	" "
12	5. Mark	X			m	looks at paper, at board, at teacher, listens	" "
	6. Ken	X			m	looks at paper, raises hand waits -	" "
1:30	7. Don	X			m	listens, moves paper, writes down a question	" "
	8. —				—		
1:31	1. Greg	X			m	raise, hold, agrees of an answer with/explains me, smiles.	" "
	2. Tim	X			m	answers to teacher "you and divide it by 5 1/4". thinks, listens	" "
	3. Glen	-			—	absent	
	4. John	X			m	looks at board, listens to teacher	" "
	5. Mark	X			m	writes down listens, moves on his seat -	" "
	6. Ken	X			m	looks at paper, listens to teacher -	" "
	7. Don	X			m	turned to board, listens to teacher.	" "
	8. —						

recitation

recitation

TIME	STUDENT	ON	OFF	?	CODE	DESCRIPTION OF ACTIVITIES, MATERIALS ETC.	LOCATION/GROUP/GROUP SIZE
	1. Gary	X			on	looks at board, listening to teacher.	at desk - whole group.
	2. Thine	X			on	answers to teacher "no" "18", listening her explanation to him.	" "
1:40	3. Glen	—			—	absent	
	4. John	—		?	off	waits, and picks up his seat work paper teacher ~~left~~ dropped on floor.	" "
	5. Mark	X			on	writes down on worksheet. listens.	" "
	6. Ken	X			on	head down writes on worksheets -	" "
	7. Jim	X			on	head down writes on exercises on worksheet -	" "
break	8. —						
	1. Gary	X			on	Solves problems from worksheet - writes down.	" "
	2. Thine	X			on	Thinks, writes down on worksheet.	" "
	3. Glen	—			—	absent	
	4. John	X			on	looks at his ~~paper~~ paper exercises, thinks.	" "
1:4(	5. Mark		X		S off	laughs turned to Angelo, tells him something while lying on desk.	" "
	6. Ken	X			on	head down, writing quietly on his paper.	" "
	7. Jim	X			on	head down, answers exercises on worksheet	" "
	8. —						

TIME	STUDENT	ON	OFF	?	CODE	DESCRIPTION OF ACTIVITIES, MATERIALS ETC.	LOCATION/GROUP/GROUP SIZE
	1. Greg	X			on	head down writes, closed math book on desk.	at desk - whole group.
	2. Tim	X	*		on	listens and looks at teacher and at girl in front of him who is helped by teacher	" "
	3. Glen	-			—	absent	
	4. John	X			on	head down, writes on exercises from worksheet.	" "
	5. Mark	X			on	hand on forehead, looks at paper, writes down	" "
	6. Ken	X			on	head down writes on paper	" "
	7. Don	X			on	looks at paper, checks on another sheet, writes down	" "
	8. —				—		
	1. Greg	X			on	answers exercises on his worksheet - pencil on hand.	" "
	2. Tim	X			RT on	receives assistance from the teacher "60 ÷ by 2 = ?" at his desk.	" "
	3. Glen	-			—	absent	
	4. John	X			on	works on his worksheet assignment	" "
	5. Mark	X			on	looks at teacher, listens to her who is at his table. -	teacher is at the cluster of tables. " "
	6. Ken	X			on	keeps on writing down, answers problems on paper	" "
	7. Don	X			on	head down - writes on paper. stops. listens to teacher.	" "
	8. —				—	END -	

P. 1 School: ____________________

SEGMENT CODING SHEET

Variable Name	Col. No.	Format	Code
1. Segment ID - 6 digits (Card 1)	1	F1.0	1
	2-3-4-5-6-7	F6.0	
2. School - 3 digits	8-9-10	F3.0	
3. Classroom - 4 digits	11-12-13-14	F4.0	
4. Subject - 1 = math 2 = second subject 3 = lab (Harvey only)	15	F1.0	
5. Day	16-17	F2.0	
6. Number segments in period	18-19	F2.0	
7. Number of minutes in period	20-21-22	F3.0	
8. Number minutes in segment	23-24-25	F3.0	
9. Is segment simultaneous? 1 = no 2 = yes 3 = partially	26	F1.0	
10. Number of simultaneous segments to this segment	27-28	F2.0	
11. Number of students present in class	29-30	F2.0	
12. Number students in this segment when it began	31-32	F2.0	
13. Number of students in this segment when it ended	33-34	F2.0	
14. Number of adults in segment	35	F1.0	
15. Type of adults in segment: 1 = teacher 2 = teacher aid 3 = oth teacher 4 = specialist 5 = oth 6 = combo 7 = no adults present in segment	36	F1.0	
16. Is this class 1 = self-contained 2 = departmentalized 3 = other	37	F1.0	
17. Is this class tracked? 1 = yes 2 = no	38	F1.0	
18. Are students in segment grouped by ability? 1 = yes 2 = no	39	F1.0	
19. Are students in segment grouped by interest? 1 = yes 2 = no	40	F1.0	
20. Use of Space Score	41-42	F2.0	
21. Project Year 1 = '77 - '78 2 = '78 - '79	43	F1.0	

SEGMENT CODING SHEET
Page 2

Variable Name	Col. No.	Format	Code
22. Instructional Format Code	44-45	F2.0	
23. Teacher Leadership Pattern	46-47	F2.0	
24. Student Behavior Code	48-49	F2.0	
25. Student Location Code	50-51	F2.0	
26. Pacing Code	52	F1.0	
27. Options Code	53	F1.0	
28. Options when finish	54	F1.0	
29. Options Specifications	55	F1.0	
30. Interaction - expected	56	F1.0	
31. Interaction - actual task-related (T-R)	57	F1.0	
32. Interaction - actual socializing (SOFF)	58	F1.0	
33. Materials feedback code	59	F1.0	
34. Textbook used by students 0 = no 1 = yes	60	F1.0	
35. Workbook used by students 0 = no 1 = yes	61	F1.0	
36. Worksheet/ditto used by students 0 = no 1 = yes	62	F1.0	
37. Paper and pencil used by students 0 = no 1 = yes	63	F1.0	
38. Reference material used by students 0 = no 1 = yes	64	F1.0	
39. Other books used by students 0 = no 1 = yes	65	F1.0	
40. Blackboard used by students 0 = no 1 = yes	66	F1.0	
41. Maps used by students 0 = no 1 = yes	67	F1.0	
42. Manipulative used by students 0 = no 1 = yes	68	F1.0	
43. P/P tests used by students 0 = no 1 = yes	69	F1.0	

SEGMENT CODING SHEET
Page 3

Variable Name	Col. No.	Format	Code
44. Test or quiz used by students 0 = no 1 = yes	70	F1.0	
45. Teacher manual used by students 0 = no 1 = yes	71	F1.0	
46. Craft supplies used by students 0 = no 1 = yes	72	F1.0	
47. Games - cognitive used by students 0 = no 1 = yes	73	F1.0	
48. Games - nonCognitive used by students 0 = no 1 = yes	74	F1.0	
49. Other materials used by students 0 = no 1 = yes	75	F1.0	
50. Textbook used by teacher 0 = no 1 = yes	76	F1.0	
51. Workbook used by teacher 0 = no 1 = yes	77	F1.0	
52. Worksheet/ditto used by teacher 0 = no 1 = yes	78	F1.0	
53. Paper and pencil used by teacher 0 = no 1 = yes	79	F1.0	
54. Reference material used by teacher 0 = no 1 = yes	80	F1.0	
Card 2	1	F1.0	2
55. Other books used by teacher 0 = no 1 = yes	2	F1.0	
56. Blackboard used by teacher 0 = no 1 = yes	3	F1.0	
57. Maps used by teacher 0 = no 1 = yes	4	F1.0	
58. Manipulative used by teacher 0 = no 1 = yes	5	F1.0	
59. Tests, pre and post, used by teacher 0 = no 1 = yes	6	F1.0	

SEGMENT CODING SHEET
Page 4

Variable Name	Col. No.	Format	Code
60. Test or quiz used by teacher 0 = no 1 = yes	7	F1.0	
61. Teacher manual used by teacher 0 = no 1 = yes	8	F1.0	
62. Craft supplies used by teacher 0 = no 1 = yes	9	F1.0	
63. Games - Cognitive used by teacher 0 = no 1 = yes	10	F1.0	
64. Games - nonCognitive used by teacher 0 = no 1 = yes	11	F1.0	
65. Other materials used by teacher 0 = no 1 = yes	12	F1.0	
66. Are teacher and students using same materials 1 = no 2 = yes	13	F1.0	
67. Group Quality Code	14	F1.0	
68. Cognitive level - expected	15	F1.0	
69. Cognitive level - actual	16	F1.0	
70. Film/Av used by student 0 = no 1 = yes	17	F1.0	
71. Film/AV used by teacher 0 = no 1 = yes	18	F1.0	
72. Last period of day? 1 = no 2 = yes (this is to be coded yes during observations that took place in the winter months when students used the last minutes of the subject period to ready, put on boots, coats, etc.)	19	F1.0	

Page 5 - Segment Coding Sheet

Segment Number:

	Column Number	Format Statement	Code
Card # 3	1	F1.0	3
Number of observations	2-3	F2.0	
Number of observations in ON CATEGORIES	4-5	F2.0	
Number coded PLAIN ON	6-7	F2.0	
Number coded DT	8-9	F2.0	
Number coded RT	10-11	F2.0	
Number coded SSON	12-13	F2.0	
Number coded SCOMP	14-15	F2.0	
Number coded XS	16-17	F2.0	
Number coded GXS	18-19	F2.0	
Number coded PERMALTS	20-21	F2.0	
Number coded PERMALTD	22-23	F2.0	
Number of observations in OFF CATEGORIES	24-25	F2.0	
Number coded PLAIN OFF	26-27	F2.0	
Number coded SOFF	28-29	F2.0	

	Column Number	Format Statement	Code
Number coded W	30-31	F2.0	
Number coded WS	32-33	F2.0	
Number coded OTH	34-35	F2.0	
Number of observations in READYING CATEGORIES (neither on nor off - no learning task)	36-37	F2.0	
Number coded STUD (student chooses to study in a non learning segment)	38-39	F2.0	

CODING DEFINITIONS

Coding for Instructional Format

The coding for instructional format provides a global description of the segments in terms of the instructional activity that is going on, and the instructional arrangements that are made. The format categories try to depict overall action patterns purposively neglecting details in which segments in the same category may differ. The emphasis is on a familiar and general characterization of activity segments.

The categories of the format code with short descriptions are listed below followed by illustrations. Certain categories that applied to only one of the subject matter areas are marked (M) for math or (SS) for social studies.

1. Seatwork. The children are working at their desks or other locations on an assignment. In mathematics, the assignment may require finding solutions to a series of math problems in the textbook, workbook, or on a worksheet. In social studies, the children may have to read silently in the textbook and then answer related questions in writing. During seatwork virtually all children have the same task assigned to them.

   The math segment 211350 and the social studies segment 031206 in the description of student behavior codes are examples of seatwork.

2. Diverse Seatwork. The children are working at their desks or other locations on a number of different tasks. Often, they are following an ordered list of tasks or choose among options after completion of a required task. This category applies to a work period or study hall type of context. If there are subgroups working on a small number of assigned tasks, and they can be clearly identified, segmentation according to tasks is used and the instructional format is coded as seatwork.

Examples are provided in the section on coding for feedback. Segment 072205 in social studies and segment 061109 in math display the characteristics of this format category.

3. Individualized Seatwork (M). The children are at their desks or other locations working on tasks which have been assigned to them or chosen by them on an individual or nearly individual basis. Individualized programs as defined below were in use when this code applied. Criteria for programs in order to be considered as individualized programs are:

(a) specified learning goals;

(b) proceeding at individual learning rates;

(c) instructional placement based on diagnostic testing;

(d) diagnostically monitored student advancement and provisions for remediation.

Individualized programs may be heavily materials oriented. They often are found to be a commercially prepared package which includes texts, worksheets, tests, and some audio-visual materials. Some districts prepared their own packages for individual instruction. In the most elaborate case children had multiple sources they could go to for specific instructional needs which meant that the child could exercise some options.

One math segment (081313) with this instructional format is illustrated under coding for feedback.

4. Recitation. A recitation involves relatively short exchanges between teacher and students. The teacher is calling on individual children to answer questions or read in turn. The children may be asked to work problems on the board during a recitation segment. Film strips where students take turns reading are included under recitation.

Examples are provided in the description of the student behavior coding. The math segment 041330 and the social studies segment 211212 display the recitation format.

5. Discussion (SS). This situation is similar to a recitation except that there is usually more exchange between the persons in this segment. The discussion segments were always led by the teacher. The teacher often wants to build to some idea and tries to elicit opinions and ideas not just "right" answers from the students. The following segment description exemplifies discussion as an instructional format.

Segment: 031422 Social Studies Format: Discussion

In this activity segment the teacher wants to develop the concepts of "independence" and "authority". Material resources in use are the chalkboard and nothing else; the children have been asked to clear off their desks. The teacher starts out by writing the two terms on the chalkboard and then developing the concept of independence followed by the concept of authority. She asks only open ended questions, more specifically, she asks about the meaning of these words and for examples to clarify answers. The students volunteer with answers all of which the teacher writes on the chalkboard sometimes changing the wording slightly. She does not make any judgmental comments. The discussion takes place between teacher and students. Students talk only when called upon.

6. Lecture. The teacher talks to students at some length about the concepts of types of problems they are working on. While there may be an occasional student question, the teacher is talking most of the time, imparting information, ideas, and/or skills. This code applies, for example, when the teacher reads out loud.

> The mathematics segment 031320 described in the section for feedback coding is an illustration. Another example for social studies is listed below.

Segment: 081415 Social Studies Format: Lecture

The class watches a film strip on the "Life and times of Abraham Lincoln". Students take turns in reading aloud the passage on the film strip. In short intervals the teacher turns off the projector to elaborate on the life style and society of Lincoln's time and compares them with today's. He extensively explicates differences and similarities between then and now, and tries to relate his comparison to learning experiences the children have had. He, also, asks some questions, but they are mostly of factual nature -- defining terms, etc.

7. Demonstration. The teacher shows how to do an experiment, how to solve a problem or how to make something.

An example for social studies is given in the description of coding for cognitive level. The format of segment 081422 has been coded as demonstration. A short description of a mathematics segment coded this way follows.

Segment: 072103 Mathematics Format: Demonstration

The teacher has handed out three commercially prepared worksheets to be completed at home. In this segment she stands in front of the class and explains the third one entitled "Graphing Pictures". The worksheet has three grids and three sets of ordered number pairs which result in a picture when graphed correctly. The teacher mentions the similarity between graphing number pairs and stock values. She explains the function of the first and second number in the ordered pair and demonstrates the actual plotting. She shows how to find the value of the first number going across the grid, and then going up in the coordinate system according to the value of the second number. The children are working on the first graph and are encouraged to help each other. After a few number pairs are plotted the teacher leads the class to the next two graphs and demonstrates an example. Again, she points out that x-values are to be looked up first in the grid horizontally, followed by the vertical y-values.

8. Checking Homework, Tests, or Seatwork. The children correct their homework, seatwork, or tests. This instructional format is an "efficient", fairly short context. It does not include instructional explanations, and additional teacher or student questions of substantive nature. Usually, the teacher provides short answers or has the children take turns in reading them off. The children check their own or another child's paper. Often, scores or the number of right answers are reported to the teacher at the end of the session.

Segment 211114 in mathematics described under the coding for student behavior serves as an illustration of this format. Segment 021207 in social studies is a further example.

Segment: 021207 Social Studies Format: Checking Work

The class is correcting previous assignments in a workbook. The teacher proceeds page by page, reading aloud the number of each question and the letter of the correct answer which belongs to a list of answers at the bottom of the page. A few times, students interrupt to present a different answer which they believe is correct. If reasonable, objections to the prescribed

answers are accepted by the teacher. At the end students count the number of right and wrong answers and figure out their percentage for grading purposes. Calling out percentages of right and wrong answers the teacher has the students raise hands. Then the workbooks are collected.

9. Test/Quiz Taking. The children are taking a test or quiz which is written or orally administered.

> Two descriptions of this format code are provided in the section Coding for feedback. The segments are 021118 (mathematics) and 061205 (social studies).

10. Group Work. The children are divided into groups with at least two children working together. Each group works on a joint task -- that is, children are sharing a common activity which requires interdependencies of actions. The tasks may be similar or different across groups. Each group constitutes a separate segment, thus, several segments may exist simultaneously and should be coded as such.

> In the code description for student behavior an illustration of the group work format in social studies (segment 081211) is available. A further illustration for mathematics is given below.

Segment: 071117 Mathematics Format: Group Work

Children in this class have had the option of choosing between four different tasks or projects. The three boys in this segment have chosen to construct a three-dimensional geometric figure. In an alcove in the back of the classroom, they sketch their design on large pieces of metric butcher paper. They measure, draw lines, erase, and draw more lines consulting books, the teacher, and each other. Some cutting is done on the floor. Interaction is at times high and mostly task related.

11. Film/Tapes/AV.(SS) This code applies to segments in which the children are watching and/or listening to films, tapes, etc. This code does not apply if discussion or recitation is frequently interspersed.

> The social studies segment 211221 in the description of the student behavior codes exemplifies this instructional format type. The code was not used for any of the mathematics segments since tapes were only used in individualized programs and the code for individualized seatwork as the type of format took precedence.

12. Contests, Learning Games. The instructional activities include cognitive games or contests which may involve all or part of the class.

Examples for this instructional format code are provided in the descriptions of coding for student behavior (math segment 081106) and coding for feedback (social studies segment 051208).

13. Student Reports.(SS) One or more students share information, talk or read to the class. Book chats, current events or group reports are common examples.

An illustration of this format is given in the description of coding for feedback (social studies segment 041219). This code did not apply to any mathematics segment.

14. Code eliminated.

15. Transition/Organizing. The children are moving from one activity to another, one place to another; are getting things ready, or putting them away. During a transition most children are not attending to an academic learning task.

Segments coded this way do not display any instructional quality and, therefore, are excluded from descriptive and quantitative analysis of instructional activity segments.

16. Giving Instructions. The teacher is telling the children the plan for an activity or time period, what to do when, what kinds of materials to use, etc. The teacher may briefly go over rules, give homework assignments or seatwork assignments, and reminders. So, giving instructions can relate to the task at hand, but it is basically procedural and not substantive.

The social studies segment 011202 in the section of coding for student behavior and the mathematics segment 063115 in the section of coding for feedback illustrate this format.

17. Task Preparation. Teak preparation is more than a brief reminder of how to do a task. The teacher is substantively preparing the students for upcoming tasks. He/she may read instructions to them and illustrate a few problems. This segment type is almost always followed by a seatwork or group work segment.

An example of a social studies segment coded this way is provided in the description of coding for cognitive level (segment 081202). A description of a math segment is given below.

Segment: 063114 Mathematics Format: Task Preparation

After the class has finished correcting the homework, the teacher prepares the children for the upcoming assignment. She moves to the chalkboard and works out one example of the problems on the next page in the text. Then she announces the next two pages as the assignment for the following two days and asks the students to start working. The preparation takes only three minutes. During this time the students listen and quietly watch the teacher.

18. Tutoring.(M) A teacher, other adult or child is teaching another child.

As an example serves the mathematics segment 021127 described in the feedback section.

19. Stocks.(SS) The instructional format stocks was created to enable coding of activity segments observed in only one classroom. This format depicts a daily record keeping of stock prices in form of a graph. In these segments the teacher reads off current market values of stocks and each child plots the value of his/her stock on graph paper. The economical aspect of this activity leads to an integration of both subject matters, social studies and mathematics, in this segment type.

Segment 072406 in the section on feedback coding exemplifies the application of this format code.

Coding for Cognitive Level and Process

An important component of describing and analyzing educational experience is the determination of the cognitive process(es) which are the goals of instructional tasks or activities. While educational objectives are not always achieved or achieved by all children, it is nevertheless important to try to characterize the goals of instruction as they are evident in observational materials taken from classroom lessons. While social and affective goals are also components of school experience, we have not systematically coded those domains.

There are a variety of systems which have been developed for categorizing educational objectives. In our work we have attempted to code the main cognitive level or process which typifies the segment. Our system applies to both subject areas because it is a fairly general one, but in fact we find extreme homogeneity in cognitive processes in math and more diversity in social studies.

We have basically adapted some broad categories from Grannis (1978) and the Taxonomy of Educational Objectives (Bloom, 1956) and incorporated some ideas from Orlandi (1971) who discusses social studies curriculum.

In our coding of cognitive process or level, we have coded both the expected cognitive level and the actual cognitive level as we infer it from the observational materials. Ordinarily these are the same. However, occasionally it is clear that materials or the teacher were aiming for a certain cognitive process, but it may not have been attained. Conversely, on a few occasions children were seen going beyond task demands to a more cognitively complex performance than expected.

The coding of cognitive level and process is partially hierarchical in the same sense that the Taxonomy follows a hierarchy built on complexity. In addition there are some categories which cross a number of taxonomic levels but which represent sets of cognitive processes and skills important in social studies.

LEVEL ONE, Receiving and Recalling Information, is a lower mental process category which is essentially identical to the Knowledge level in the Taxonomy. In segments coded at this level students receive information (or facts) through lecture, demonstrations, student reports, tapes and/or reading. Recall and recognition are often demanded in seatwork tasks, in tests, and through recitations in which children answer teacher-posed questions.

The following segments are examples of activities coded at Level One.

Segment 11124 Math Format: Lecture

The teacher has divided the class into three seatwork groups and is lecturing a group of eight children about parts of fractions. This topic is the subject of the textbook problems which have been assigned to the students. The teacher reminds the students of a definition of a fraction.

Segment 21107 Math Format: Checking Homework, Tests, or Seatwork

In this checking homework segment, students exchange math papers for grading while the teacher quickly writes the answers to the twelve problems on the blackboard. The problems involve multiplication of fractions. Students check and return their papers. The teacher then reads off the number of each problem and asks students to raise their hands if they missed the problem. This procedure is conducted quickly and with no substantive discussion of the problems.

Segment 31219 Social Studies Format: Recitation

In this segment the teacher leads the whole class in a recitation using the social studies text and map skills workbook. His rapid fire questions directed at individual students emphasize review of the textbook material on the American colonies, e.g., "How many colonies were there?" "What is the House of Lords?" and recall of geographical terms presented in the map workbook, e.g., "What is the equator?" "What is a diameter?"

Segment 81202 Social Studies Format: Task Preparation

Students are seated at their desks looking over rule sheets for a simulation game which is being used for the social studies unit on the settlement of the American colonies. The teacher goes over the instructions, calling on students to state the rules for recording game points and asking students to read certain sections of the rule sheets.

LEVEL TWO consists of Learning Concepts and Skills and practicing concepts, skills, and algorithms. At this level children learn basic ideas in a subject going beyond isolated facts to concepts and patterns of facts and ideas. Comprehension, including the ability to restate information, and classification of information is coded at this level. Learning arithmetic algorithms and practicing them is a major component of cognitive processes coded here.

At Level Two students are not only exposed to information, but the emphasis is on teaching and learning concepts and skills. In mathematics students are introduced to concepts and computational algorithms such as manipulations with fractions and decimals and they practice these skills. In social studies, students may summarize a paragraph in their own words or restate an idea from written materials, they may classify, compare and contrast information.

When children work together in groups, it is especially important to assess the actual and expected cognitive processes. Decision making within a group, if it is based on comparing and contrasting alternatives without considerable cognitive depth, is coded at Level Two for the actual cognitive level of the segment. This may occur even though the expected cognitive level could be more complex.

Segments which are typical of Level Two are:

Segment 61106 Math Format: Recitation

The teacher is conducting a whole class recitation on changing whole numbers and mixed numbers to fractions. She draws representational figures on the blackboard as a way of demonstrating the principles involved in converting whole numbers to fractions. Her explanation complements the math text preceding a set of problems which are to be assigned as seatwork in the next segment. Students sit at their desks listening to the teacher's presentation. Occasionally, the students respond in unison to the teacher's questions about fractions.

Segment 041302 Math Format: Seatwork

The whole class is engaged in individual seatwork which involves completing a set of problems in the math textbook. The problems are short-answer, and require students to practice their skills in identifying correct fractional terms (for pictures of shaded figures and written statements) and adding simple fractions. The teacher circulates and answers a few student questions

Segment 41211 Social Studies Format: Recitation

The teacher is leading a recitation with the whole class about "goods and services" as the students follow along in their workbooks. The teacher reads from her teacher's manual a series of questions about this topic, e.g. "What does a baker supply? What does a minister?" "A good or service? Students write the answer in their workbooks after each response. She then discusses the difference between goods and services and asks the class "Can anyone give a definition of goods and services in their own words?" One student answers her question. The teacher proceeds to ask the class to look up "goods" and "services" in their dictionaries and one student reads the definitions aloud from the dictionary.

Segment 31410 Social Science Format: Seatwork

Students are working at their desks on a social studies seatwork assignment--a teacher-made worksheet with short answer type questions. Some of the questions ask for identification of facts e.g., "List the thirteen colonies" while other questions require students to summarize ideas and information about the American colonial period e.g., "Give two reasons why the early colonists came to the New World?" "What are immigrants?" "How did immigrants change the population?" The teacher suggests at the beginning of the segment that students can use their textbooks, social folders and other resource books in the classroom for completing this assignment.

LEVEL THREE consists of Application of Concepts and Skills and is considered a higher mental process activity. Concepts and skills are applied to new but familiar situations. For example, in mathematics when a student is

asked to solve a story or word problem the student must decide which computational procedure to use and then apply it. In social studies, transferring ideas from one context to another, for example applying the concept of ecological niche to a new cultural setting or using methods of conflict resolution to solve a hypothetical interpersonal problem would be coded here. Role playing activities are usually coded here. In a group problem solving situation the actual cognitive level would be coded application if decision making in the group follows a substantive discussion but lacks evaluative quality.

Illustrations of cognitive Level Three segments are:

Segment 62107 Math Format: Recitation

The teacher is standing at the blackboard leading a recitation for one math group (approximately ½ of the class) while the other students sit quietly at their desks. She asks students in the math group to turn to a page in their math texts and proceeds to review the math problems on the page. These problems will be assigned as seatwork in the next segment. The problems require students to translate a story problem into an equation, e.g., "Mary had a certain number of dollars. She spent such and such. How much did she have left?" After a student reads a problem from the text, the teacher elaborates by asking questions like, "What king of problem is that?" "What kind of equation will we do with that?" and goes on to illustrate a solution on the blackboard.

Segment 31122 Math Format: Seatwork

In this seatwork segment, students are completing a worksheet with ten story problems. The problems are set up so that students must translate words describing a numerical relationship into an equation e.g., "Three girls sold 45 iceballs at 5 cents each. What will be each girl's share?" The problems require the following skills: computing an average, adding fractions, calculating profits, and subtracting, multiplying and dividing. Some of the problems involve more than one skill in the case of calculating profit. The teacher circulates among the students, answering questions and helping students through the steps of a problem. In one instance, the teacher discusses the principle involved in calculating a profit.

Segment 81215 Social Studies Format: Groupwork

A group of six students are working at their desks on a problem which is part of the social studies simulation game, "Sailing to the New World." Using calculators and worksheets, they complete a set of computations for ordering their supplies for sailing to America. The activity is complicated

by the fact that supplies have different weights and the group is restricted to a certain weight. This group works carefully, sorting their supply cards into three equal piles and double-checking their calculations.

Segment 81405 Social Studies Format: Recitation

The teacher is leading a whole class recitation using the social studies text. He asks individual students to read short stories from the textbook about families discussing a problem. Following each reading, he calls on another student to restate in his/her own words the family's problem presented in the story. The teacher extends the discussion by asking students to think about how family members in the story feel and how the problem under discussion could be solved.

LEVEL FOUR, Higher Mental Proce ses, encompasses all other higher processes in the Taxonomy beyond Applic tion. At the fifth-grade level, these processes do not occur frequently and therefore separate categories did not seem warranted. This category includes production of generalizations and hypotheses, as well as the processes of analysis, synthesis and evaluation described in the Taxonomy. The solution of an unfamiliar problem in mathematics would be coded here as would the generation of a method of solution or the generation of a rule for a variety of problems. However, we found only one math segment at this level in all of our observations.

In social studies, students may state hypotheses or make generalizations when comparing cultures or historical and social events. The level of synthesis might be reached when students write a report using more than one reference source. Decision making of groups or individuals that displays the awareness and consideration of alternatives using reasoning and evaluation is coded here.

Examples of segments from our social studies data which were coded Level Four are:

Segment 81207 Social Studies Format: Group Work

A group of five students are discussing the merits of three alternative reasons for sailing to the new world. This activity is part of a simulation game used for the social studies unit on the settlement of the American colonies.

The teacher has identified in her preparation that there are certain consequences for each decision e.g., "If you are sent by the government you pay ½ of your land to the government," and reminds the students that these should be considered when making the final decision. The task requires students to make one group decision and the students in this segment discuss their options seriously. In addition, they talk about how to arrive at the decision, whether to vote, draw lots, etc.

Segments 91271-91278 Social Studies Format: Group Work

Groups of two and three students are spread around the room playing rounds of "The Crossing Place Hunting Game," which is part of the MACOS curriculum unit on Eskimos. The game requires players to apply different strategies in a mock hunt of caribou. A game board and die are used to play the game. In her instructions, the teacher tells the students to "talk about a strategy that will help you kill more caribou on the next game." After completing three rounds, students fill out a worksheet with questions dealing with analysis and synthesis of their game strategies, e.g., "How is this game similar to a real caribou hunt at a crossing place?" "What advantages does the crossing place method have over the bow and arrow method?"

Segment 41439 Social Studies Format: Learning Game

In this segment, all of the students are seated at their desks and are taking turns inventing their own rebuses for the names of the states. The pattern of this segment is that one volunteer goes to the blackboard and writes an original rebus while the other students try to solve it from their seats. The students are quite involved in this learning game.

Categories five and six address research ability, a major objective in social studies. They are not hierarchical in the sense of being more cognitively complex than the preceding levels, but have been separated out as cognitive processes which are important components of some social studies instructional programs.

LEVEL FIVE is Research Skill A: Location of Information. Segments coded in this way include students using reference materials such as encyclopedias, atlases, dictionaries and other sources to obtain information, usually for written reports. This cognitive category includes activities which range across both lower and higher mental processes, but often is centered around obtaining and comprehending information as well as actually practicing the

reference tool skills. Thus it is often similar to Level Two but can be more complex when students are obtaining information from multiple sources.

Segments coded at this level are:

Segment 211407, 211408 Social Studies Format: Seatwork

In both of these seatwork segments, students are working individually on state reports. Each student has been assigned a state and is expected to write a report using several references. In one of the segments (211407) a group of five students are looking up information in reference books at the Learning Resource Center. In the other segment (211408) the students research their reports using classroom reference materials e.g., encylopedia, almanac, and an opaque map of the states. Some of the students go to the teacher with their questions about the research, e.g., "How do you look up the governor of the state?"

Segment 211207 Social Studies Format: Seatwork

The whole class is engaged in a seatwork activity in which students are expected to find out about different careers using newspaper want ads. The students read, classify, clip, and paste the ads using guidelines provided by the teacher. For example, the students are instructed to find out whether the job requires a college degree, what the working hours are, etc.

LEVEL SIX, Research Skills B: Use and Interpretation of Symbolic and Graphic Data, involves students working with symbolic data. Students read and acquire skills to read maps, graphs, charts, tables and cartoons. Students make maps, graph data, and create charts to display information in symbolic form. Segments coded in this category include a number of other cognitive levels, but are at least Level Two.

Segments coded at this level include:

Segment 31405 Social Studies Format: Seatwork

Each student in this seatwork segment is creating a population chart for three assigned states. The task involves converting population information from bar graphs on data cards to population figures (numerals) on a chart. This activity is completed quickly by the students at the urging of the teacher.

Segment 81420 Social Studies Format: Learning Game

The whole class is involved in a contest activity which is called "Game of the Fifty States." The teacher divides the class into two teams with captains

and a member of each team comes up to the front of the room. Then, the teacher holds up a flash card with the outline of a state and the first team member to recognize the state wins a point for his or her team. The tempo of the game is fast-paced.

Segment 81422 Social Studies Format: Demonstration

The teacher lectures to the whole class about how a mercader projection distorts the poles. He instructs the students to roll their softcover atlases so as to illustrate the difference between the shape of a rolled map and a globe. The class proceeds to turn to the maps in their atlases--following along as the teacher reviews certain geographic locations.

The final category used for this variable was Not-Applicable. This category was used for segments in which the cognitive content seemed minimal or not relevant. Sometimes these segments were oriented toward other primary goals which were nurturing creativity, or social and affective outcomes. There were a number of instances in which children produced murals or made craft projects. In these cases it seemed that the tasks had little cognitive demand after the planning phases and segments were coded Not-Applicable We do not mean to imply that artistic work is non-cognitive, but the particular quality of the segments involved did not suggest cognitive learning or skill often because the tasks were too easy or projects extended too long.

Examples of segments in this category were:

Segment 51210 Social Studies Format: Group Work

Five boys are seated together beginning a mural on the "Wild West." The boys start to discuss the items they could draw on their mural but bickering about who is in charge breaks out. An angry exchange takes place between one of the boys and the teacher about "talking out of turn" and the teacher reprimands the entire group. She seperates the boys as the segment ends. The mural project continues over a seven day period and episodes such as this one are not uncommon.

Segments 171202, Social Studies Format: Diverse Seatwork

Students are working in a diverse seatwork situation, pursuing a variety of craft activities e.g., finger knitting, making posters, sewing in preparation for a classroom open house. While the purpose of these activities is to construct crafts representative of Israel, this focus is lost in the actual process of designing and making the projects. Several students wander or stand around the room during these segments. This activity continues over seven non-consecutive instructional days.

Coding for Pacing

The term pacing is borrowed from Gump (1967). It refers to who is determining the rate of work in an activity segment. The variable has also been used by Grannis (1975) and called press. Four categories of pacing were identified and coded.

1. Teacher Pacing. The child works or attends at a rate set by the teacher, not by his own desires. This occurs when the teacher is running a subgroup or whole class activity, a recitation or a demonstration, for instance.
2. Child Pacing. This code is applied to segments in which the child determines his own rate of work, though the teacher may intermittently monitor or interact with students. Instructional situations, such as seatwork, student reports, or reading serve as examples.
3. Cooperative Child Pacing. The children cooperatively control the pace when working together on a joint project or task. This code finds more application in social studies segments, since in social studies group projects occur more often. For instance, the children play the simulation game Sailing to the New World, they paint murals of the Old West, or they work on a career display. In mathematics, cooperative pacing is found when students are in a tutoring situation or are playing a cognitive game like Contig.
4. Mechanical Pacing. This code is used for instructional activities in which the work is set by a technical device, commonly an audiovisual aid. When watching a film or listening to a record neither the teacher nor the students control the pace. None of the mathematics classes used audiovisual aids; this code applied only to social studies segments.

Coding for Teacher Leadership

The coding for teacher leadership is influenced by Gump (1967). The code tries to sketch the variety in the teacher's role and function in the activity segments.

1. Not in Segment. The teacher is not helping the students in this segment; he/she is not clearly or consistently attending to this activity segment. The pupils' action is not directed or aided by the teacher. The teacher is usually busy in another segment.

2. Watcher/Helper--Intermittent. The teacher is watching and helping the students with their assigned tasks. The teacher may circulate, may stand at the back of the room, or may be at the teacher's desk. At times, the students may approach the teacher for help.

3. Watcher/Helper--Continuous. In this segment, the teacher's actions are focused on watching and helping the students with their assigned tasks. The teacher may circulate, paying much attention to the students' progress and needs. From the students' perspective, the teacher would be aware of children needing assistance. Vigilance is not for disciplinary goals but for instructional goals. This watcher/helper seems to be a "with-it" teacher in this context.

4. Recitation Leader. The teacher asks for reciters, comments on answers, and may quiz. He/she may direct a discussion and/or give brief, interspersed explanations.

5. Instructor. The teacher tells the students how to make something, what some facts are, etc. This is not done in a recitation format; the children are not asked for any contributions. Information is handed out: the teacher gives instructions, lectures, or demonstrates. The teacher may answer some student questions and may, also, briefly check if they understand the instructions.

6. <u>Action Director</u>. The teacher gives directions for cleanup, orders to manage an activity, leads a song, or sets up team games. Rather then supplying the core action, the teacher is the key to the action in making demands for doing something.

7. <u>Participator</u>. The teacher is not leading the activity, but is a genuine participant along with the others. The teacher may sing with, salute with, or play a game with the children.

8. <u>Reader</u>. The teacher reads orally to the children.

9. <u>Tester</u>. The teacher administers a test or quiz to the children either orally reading the questions or proctoring as they work silently.

10. <u>Other</u>. The teacher's leadership is coded here, if none of the above categories apply.

Coding for Student Behavior

The code for student behavior describes the students' activities in the instructional segment. The twenty-nine categories applied give witness of the large variety of activities pursued during instruction. One third of the categories coded prove to be subject specific. Eight of the categories are descriptive of student behavior in social studies lessons only (S), while two more categories specifically describe student activities in mathematics (M). The remaining categories for student behavior could be applied to both mathematics and social studies instruction, but occurred more often in one or the other subject. -- A code definition follows: examples are provided for frequently occurring behaviors in the subject indicated.

1. Question/Answer. The students orally are asking questions and/or are giving answers. This code describes the typical student behavior in recitation sessions in social studies and mathematics.

Segment: 041330 Mathematics Format: Recitation

The topic of this recitation segment is cancelling when multiplying fractions. The teacher puts five examples on the chalkboard and leads the class step by step through them. At each step the students provide answers to the teacher's inquiry about what to do next and why. They seem to be highly attentive throughout this exercise.

Segment: 211212 Social Studies Format: Recitation

This recitation is based on a previous assignment on types of jobs that children found in the classified ad section of local newspapers. They

report on some of the jobs listed and answer additional questions put by the teacher for clarification. Typical questions are "What type of education do you need for this job? What is the income? Is it a day or night job? Does the job require standing or sitting?" Not only the child reporting but others as well volunteer to answer these questions.

2. Read/Oral. One or more students are reading orally from the textbook, magazine and the like.

3. Solve/Desk. The students are solving problems either mentally or on paper at their desks. They may be working on a series of mathematics problems or on short answer questions in social studies. The work on essay-type answers is not coded here.

Segment: 211350 Mathematics Format: Seatwork

A previous recitation session had served to acquaint the children with the task requirements of the seatwork. The task is to add mixed numbers with like denominators. Two of the problems in the text are story problems similar to the ones solved in the recitation session. The children work quietly at their desks. Feedback is provided largely by the textbook.

Segment: 031206 Social Studies Format: Seatwork

The children are assigned a mimeographed worksheet to complete at their desks. They define terms used in social studies or in language arts such as "noun, longitude, Cortez, median", etc. with the help of their social studies and language arts textbooks and dictionaries. The teacher is also available to answer questions.

4. Blackboard/Solve. One or more students are solving problems at the blackboard while the remainder of the class solve the same problems on paper at their desks.

Segment: 021320 Mathematics Format: Contest

In this skill contest on multiplication of fractions the six rows in this classroom represent six teams competing against each other. Each turn a different student from each row comes up to the chalkboard to solve a problem as quickly and accurately as possible. The problem is to be solved by all students in class, however, only competitors at the board gain points for their team. The first student with the correct solution gains two more points than the second one with the last student earning zero points.

5. Blackboard/Watch. One or more students are solving problems at the blackboard while the remainder of the class passively watches from their desks.

Segment: 011102 Mathematics Format: Recitation

The class is divided into three groups according to achievement. In this segment the teacher works with nine students on adding fractions with unlike denominators. She solves three examples at the chalkboard asking the students how to proceed next at each step. Then, she puts seven different problems on the board and asks seven students to work them out. The students at the board take turns explaining the steps involved to obtain the answer to their problem while the others watch. This is followed by the two students who have not been at the board previously getting their turn and explaining two additional problems to the group.

6. AV/Recitation. (S) The students are watching a film strip and take turns in reading out loud the accompanying text. The teacher makes comments and intersperses questions.

7. AV/Read. The students are watching a film strip and take turns reading out loud the accompanying text. There are few or no questions and comments from the teacher.

8. Choral. (M) The students respond in unison to the teacher's questions.

9. Checking Work. The students are correcting homework, seatwork or tests as the teacher or some of the students read off answers, or write answers on the blackboard. There is no recitation involved; no explanations are given -- merely the correct answers are provided for the assignment.

Segment: 211114 Mathematics Format: Checking Work

The teacher stands in front of the class and reads quickly the answers to the homework from the teacher manual. The children look at the answers on the paper they are correcting. Some ask her to repeat answers or have questions regarding partial credit if the answer was not reduced. The teacher gives clarifications before collecting the papers.

10. Discussion/Listening. The students are engaged in a discussion, or they may be just listening to the discussion taking place. The discussion may engage the teacher and the whole class, the teacher and a subset of the class, or the discussion may only involve members of a cooperative group.

Segment: 081211 Social Studies Format: Group Work

In this segment a group of five girls are at the beginning of the simulation activity "Sailing to the New World". The group has 2,345 points to spend for outfitting their three ships. They discuss how many units of men, women, guns, animals and the like to acquire. There is strong disagreement at times and it is hard for the girls to compromise. Another task is to find names for their colony and ships. Not being able to agree on a name for their colony, they finally put all suggestions on papers and draw one out of a hat.

11. Film/AV.(S) The students are watching a film or are listening to a record or tape. This code includes watching a filmstrip accompanied by a record.

Segment: 211221 Social Studies Format: Film/AV

The students watch quietly a filmstrip about the life and culture in the thirteen colonies. The teacher does not comment throughout the six-minute showing. Her students are very attentive. They enthusiastically clap when the film strip ends.

12. Listening. The students passively listen to and watch the teacher. They may have occasional questions, but the teacher does most of the talking and is the center of attention. This code, also, applies when students are listening to one or more peers giving a report.

Segment: 011202 Social Studies Format: Giving Instructions

The teacher explains for about eight minutes a new class project to a group of students. The group is to choose an aspect of Black History, and clip related stories and pictures out of magazines and newspapers. Then students have to write a report accompanying the materials which will be collected in book form. Today's task is to find a worthwhile aspect before searching for newspaper clippings. While receiving the information this group sits at their desks and listens.

13. Read/Silent. The students are reading silently at their desks. This can include both task or subject related reading and non-task related reading materials such as fiction or magazines.

14. Test. The students are taking a test or quiz which is either written or orally administered.

15. Write.(S) The students may copy questions from the textbook or blackboard and/or answer questions in essay form. They may write a composition.

Segment: 091438 Social Studies Format: Groupwork

Three students work cooperatively on two printed worksheets. The cognitively demanding task requires the students to synthesize information from several sources to adequately answer questions about the Netsilik Eskimos. The students respond in written form.

16. Research.(S) The students are engaged in research using textbooks, encyclopedias, and other research materials.

Segment: 041446 Social Studies Format: Groupwork

In this segment two children cooperate in collecting some necessary information for their career project. The project includes a report about a career and the making of a poster advertising the services of the career and a presentation of the product associated with it. The children use encyclopedias and other available resources from the classroom and the library.

17. Drawing/Painting.(S) The students are drawing or painting posters, murals, and the like.

18. Maps.(S) The students are drawing or using maps.

Segment: 031214 Social Studies Format: Seatwork

After a very brief recitation session which served as an introduction to basic map skills, the students are to complete an assignment in their workbooks on map skills. Since they are not allowed to write in the workbooks they copy the map with tracing paper and then make further drawings to complete the tasks stated at the bottom of the page.

19. Graphs. The students are making or using graphs and/or charts.

20. <u>Crafts</u>. The students are making crafts.

Segment: 071229 Social Studies Format: Group Work

In this school students are working in small groups on craft projects under the UNESCO motto "1979, The Year of the Child". The projects in this class focus on the child in Israeli culture. Students prepare posters, weavings, book markers, etc. This segment contains three children sewing with yarn on burlap to create a wall hanging.

21. <u>Manipulatives</u>. The students are using manipulatives such as protractors, rulers, metric sticks and the like.

22. <u>Tutor</u>.(M) One student is tutoring or instructing another student.

23. <u>Game-Cognitive</u>. The students are playing a subject-related game with one or several partners. This game has a cognitive component. Examples of cognitive games are Contig and Math Bingo in mathematics, the Caribou Hunt Game and the In-Out Game in social studies.

Segment: 081106 Mathematics Format: Learning Games, Contest

In this segment a group of five students play <u>Contig</u> in the math laboratory. One student is the scorekeeper while the other four play in teams of two against each other. The game requires students to choose an operation such that it will make a true number sentence out of three numbers obtained by throwing dice.

Segment: 091255 Social Studies Format: Group Work

Earlier in the week the class had watched a film on the Netsilik Eskimos' Caribou Hunt. Now, they play a MACOS designed board game resembling with its rules the real hunt. A team of three players represent one hunter on land, one in a kyak on water, and one caribou herd moving on land or water. Adhering to quite complicated rules the objective of each player is to make a kill. The children get very involved as they try to find successful strategies.

24. Code eliminated.

25. Rehearsal-Play.(S) The students are rehearsing for a play.

26. Contest. The students are participating in a contest either individually or in teams.

27. Readying/Transition. The students are getting ready for instruction. This includes putting books away, taking other books or papers out, and waiting for the teacher to start the next instructional activity.

28. Code eliminated.

29. Question/Answer-Oral/Reading. The students are reading orally from the textbook, magazine, etc.; they answer orally questions interspersed by the teacher.

Segment: 051421 Social Studies Format: Recitation

In this recitation segment the teacher calls on one student at a time to read aloud a paragraph in the text. After each paragraph the teacher paraphrases the content in one or two sentences and asks questions suggested by the teacher manual. Several children will supply answers until the teacher obtains the specific one she is looking for. Sometimes she interrupts during the reading to intersperse questions clarifying definitions of terms.

30. Other.(S) The students exhibit behavior not described by any of the above codes.

31. Variety. The students exhibit a variety of the behaviors described above.

Coding for Feedback

The variable feedback refers to ways in which students can gain information about the correctness of their performance and/or gain assistance in accomplishing a task. While feedback to students is often delayed at the fifth-grade level, this category was applied to feedback sources available to children while a segment was in operation.

The feedback variable was coded for segments under all pacing conditions but was believed most important when children were working on their own in the child-paced situation. Our method for coding feedback varied somewhat depending on the pacing condition. Under child-paced and teacher-paced segments we coded feedback categories and combinations of categories. Under cooperatively-paced segments we coded feedback categories making the assumption that student feedback -- the availability of children to one another -- was always present. Thus in cooperative segments, a category code is actually student feedback plus the relevant category.

There are a variety of types of feedback. Feedback associated with the materials in use is one major type. Worksheets with answers, manipulative devices, and textbooks with illustrations are examples of feedback types which are part of the materials in use. Another major class of feedback is provided by other people: teachers or children. We distinguished two levels of feedback provided by the teacher. Combination codes apply to Teacher feedback in conjunction with materials feedback. Children also help one another.

There are situations in which feedback does not seem relevant. We coded such situations not-applicable for feedback. They were primarily segments in which children were receiving information and in which questions

and answers were in no way expected. The most common instances were audio-visual segments such as the showing of a film or segments of giving instructions which are highly routinized and lack substantive depth. The distinction between cases in which feedback was coded none and not-applicable rests on the fact that the segment coded none might have appropriately contained feedback but did not whereas the not-applicable segments did not seem t require feedback.

The complete coding system will be described and illustrated in the following section. The categories are those applied to child and teacher-paced segments. Cooperatively-paced segments also use these categories but assume the presence of student feedback.

The Codes used for feedback are listed below and the first nine subsequently defined and illustrated. Categories 10-12 are combinations.

1. None
2. Manipulatives or Self-Correcting Materials
3. Books
4. Self-Check
5. Student Feedback
6. Teacher-Low
7. Teacher-High
8. Not-Applicable
9. Textbook Only
10. Teacher-Low and 2, 3, and/or 4
11. Teacher-Low and Textbook(9)
12. Teacher-High and 2, 3, and/or 4

1. <u>None</u>. This code is applied when the children have no way to check on the correctness of their answers or procedures. They are using materials which do not have answers or other feedback properties. They are not given access to the teacher or children as information or do not approach the teacher though he/she may be available for help. A common example of this code occurs when children are taking tests or working on a set of problems on a ditto sheet. If a child is using a textbook the nature of the task and the text must be considered. If, for example, the task is to answer factual questions in social studies the answers may be available in the text thus providing a feedback source. In math if the text does not contain explanations or examples feedback is coded as "none" if no other feedback is available. In teacher-paced segments "none" is coded when there is no exchange between students and teachers about correctness or children's understanding of work. For example, in some recitations or lecture segments the "none" code occurs even though feedback could have occurred in the segment. For cooperative-paced segments a code of none cannot occur since the assumption is made that children working in a group situation are available to each other for feedback at all times.

The following segments are representative of those in which feedback was coded as "none":

Segment: 062133 Mathematics Format: Seatwork

The seatwork assignment is two commercially prepared worksheets on multiplication of fractions and division of decimals. While students work on them, the teacher corrects papers at her desk and hands them back a little later. Papers less than 80% correct have to be corrected by the student

and are, thus, additional seatwork. During the segment the teacher helps only one child briefly. The assignment was introduced during the previous recitation segment.

Segment: 021118 Mathematics Format: Test

In this segment students take a short quiz. The teacher had written ten problems on the chalkboard before class and now asks the students to solve them in a ten-minute time period on a sheet of paper. The teacher supervises the class, extends the time for the quiz but does not assist in problem solving.

Segment: 072406 Social Studies Format: Stocks

In this brief segment -- it lasts only three minutes -- a stock market report based on the previous day is given by the teacher to update the students on their chosen stocks' value. The procedure is such that she names the letters alphabetically and the children call out the name of the company they bought stock from. Then she reads the current price and the children record it on graph paper. The record keeping in form of a graph has been started some time ago.

2. Manipulatives or Self-Correcting Materials. Manipulative or self-correcting materials are those in which the materials themselves provide information about correctness through operating with them. Measuring devices, hand calculators, computers, tracing paper and the like are included here.

These feedback mechanisms are more common in mathematics than in social studies. Some individualized instructional programs use such devices in the course of instruction. For example, children receive instruction by listening to tapes or through computer assistance. Manipulatives can also be seen during math seatwork when children use hand calculators for computations or protractors and rulers for measuring purposes. In group work situations children can be found practicing basic arithmetic facts with flashcards or using other manipulatives. Under cooperative pacing, codes are in addition to student feedback which is assumed.

Autotelic devices are rarely used in social studies. Our observers recorded flashcards for state names, tracing paper, and calculators in a few instances.

Examples coded in this category are given below:

Segment: 011104 Mathematics Format: Seatwork

The class is divided into one recitation and two seatwork groups. Of the five children in this segment sitting in desks in the back of the room, three work on addition and two practice subtraction of one and two digit numbers using flashcards.

Segment: 081313 Mathematics Format: Individualized Seatwork

As part of the individualized instruction offered in this classroom one student receives audio instructions in an AV-equipped room. While listening to the tape which is part of an SRA learning kit, he fills in his worksheet.

Segment: 081231 Social Studies Format: Group Work

As part of the simulation activity "Sailing to the New World" built around the settlement of the American colonies, the children need to compute units of food consumed by the settlers. Then they have the choice of giving up food units or animals to account for the consumed food. This segment comprises the calculations of food units which are executed by a group of boys with a hand calculator. The boys are quick and complete the task correctly. They do not demand the help of the teacher as do the other two groups in simultaneous segments.

Segment: 031217 Social Studies Format: Seatwork

During seatwork the students spend most of their time copying the U.S. map in their Map Skills Book using tracing paper. They include each state with its name and even trace the compass rose. After having completed the map, students answer the nine quesions on geography at the bottom of the same page.

3. Books. The children are using books or other reference materials which have discursive text. Fiction books may be included here. Atlases and other map materials are also included as reference materials. Textbooks which are in regular use are not coded here but a curriculum set with reference materials might be.

It appears that books other than textbooks are not used in mathematics. [Only one math segment was coded "books" and this was due to the teacher giving children having completed the assignment the option to read fiction.] In social studies this code applied when children tried to locate information for class projects or student reports, often in library or resource centers. Children also looked up definitions of new terms in dictionaries or completed map skill exercises with the help of atlases.

Segments coded in this category are as follows:

Segment: 041417 Social Studies Format: Seatwork

While some students work in small cooperative groups the seven students in this segment have chosen to work alone. Like the others they are each preparing a folder on a career of their choice. A large variety of reference sources supplied by the district-wide career cooperative provide extensive information about careers and aid in the students' decision making process about which career to present.

Segment: 072205 Social Studies Format: Diverse Seatwork

The nine students in this segment use the resources in the library for their upcoming presentations on an ancient civilization of their choice. The teacher is with the rest of the class in their classroom.

4. <u>Self-check</u>. The teacher explains how the children can check their own work. When answer sheets or teacher manuals are made available for checking this code applies. The teacher may explain an algorithm or method for checking work that does not use answer sheets but which allows the child to assess correctness. For instance using multiplication to check division would be a self-check algorithm.

This code is more applicable in mathematics than in social studies. Commonly, segments with children using individualized learning packages accompanied by answer sheets fall into this category. Also, the seatwork in some traditional classes is arranged such that children go to the teacher's desk to compare their answers with an answer sheet or teacher's manual.

Examples of segments coded this way are described below:

Segment: 041338 Mathematics Format: Seatwork

In this segment students learn concepts and practice computational skills by solving the assigned problems in their workbook. Though the teacher does talk to one or two of her students her attention is focused on finding a specific ditto master. As usual, students check their answers by going to the teacher's desk and comparing them with the answer sheets.

Segment: 211309 Mathematics Format: Individualized Seatwork

Three accelerated students work in a backroom attached to the classroom. They study a different unit than the rest of the class relying mainly on a learning package put together by the teacher. Answers are made available to the students who check the correctness of their assignments after completion and record the number of mistakes. These students show very responsible behavior: they seldom need help or supervision from the teacher.

Segment: 211224 Social Studies Format: Seatwork

The students are working on a photocopy of the U. S. map. They outline the colonies as they were before they changed to states, then they label them and color them in. A map displayed with the overhead projector aids in checking their work. There is hardly any teacher-student interaction.

5. <u>Student Feedback</u>. Children give information or feedback to one another. Children check each other's work or give assistance to one another. In mathematics children most commonly provide feedback to each other when they play learning games or are in a tutoring situation. Working jointly on a written assignment occurs less often. The most likely instructional situations with this code in social studies are group work and learning games.

This code finds application in cooperative group work only if there is no other source of feedback available to the group. If additional sources of feedback are in operation this code is superseded by the appropriate code for the other feedback source as student feedback is assumed as well.

The following segments exemplify the coding:

Segment: 081128 Mathematics Format: Learning Games

Five students are in the math lab adjacent to the classroom playing Contig, a math game. Four students are players while the fifth one is the score keeper. The players take turns in solving math problems prescribed by the score keeper. The correctness of their answers is determined by all participants.

Segment: 021127 Mathematics Format: Tutoring

In this segment a student who had been hospitalized and, therefore, was out of school for several days is taught by another student how to multiply fractions at the teacher's request. There is a lot of interaction between the two. While talking the tutor is repeatedly pointing at examples written on a sheet of paper.

Segment: 051208 Social Studies Format: Group Work

Four girls cooperate in this segment. They start a new class project which is to design and carry out a mural on the topic of "How the West is Won." In planning the mural each of the girls draws a picture on a separate sheet of paper. Then they discuss the options of selecting one drawing versus synthesizing the mural using part of each drawing. They decide on one picture they like best and start sketching outlines on their paper for the mural. The teacher is circulating among five groups during this time not getting actively involved with this one group.

Segment: 041439 Social Studies Format: Learning Games

The teacher introduced rebuses on a commercial worksheet in the previous segment. Now the students make up their own rebuses matching the names of states and present them to the class. One to two students at a time draw their solution on the chalkboard and the others try to find the name of the state. Though the teacher participates in solving the puzzle the feedback is provided by students.

6. Teacher-Feedback-Low. To be applied this code requires the teacher to be in the segment and available to the children. She/he provides occasional answers, corrections, comments to children individually or in groups. The teacher may circulate or be at some fixed location like the teacher's desk. The nature of the exchanges between teachers and students must be substantive and have a feedback quality -- that is they are motivated by student behaviors that need correction or reinforcement about the learning process itself. Teacher's comments about good behavior/bad behavior and procedural matters are not considered feedback.

The low category of teacher feedback is applied when the teacher's level of activity is low to moderate in regard to the proportion of time of a segment spent in contact with children and with regard to the number of children so contacted. Also a judgement is made about the qualitative depth involved in the responses given to children. In order for this category to be coded more than one child has to be contacted for feedback purposes. No other sources of feedback such as described in prior codes can be operating at the same time. If other feedback sources are in the segment then a combination code should be used.

In segments coded as Teacher-feedback-low children tended to complete assignments on worksheets, gave reports, played instructional games or worked on their group projects with some assistance from the teacher. Many recitations were coded with feedback in this category. Similarly most supervised child-paced work was coded here.

The following segments represent the coding in this category:

Segment: 211134 Mathematics Format: Recitation

The teacher notices many students having trouble multiplying a whole number by a fraction. She uses a recitation format to review the steps necessary for the operation. She writes each step on the chalkboard and asks her students what they have to do next. The students watch and answer. The algorithm of the operation is stressed over underlying concepts.

Segment: 031109 Mathematics Format: Seatwork

The teacher hands out worksheets on operations with fractions to be started in class and finished at home. He indicates that students should ask him for help if they need any. He moves around the room, stops at children's desks or asks them to come up to him when they raise their hands. His interactions with children are frequent but short. He will indicate what is wrong and show quickly how to do it right but he will not explain the underlying concept which is apparently not understood.

Segment: 041219 Social Studies Format: Student Reports

The students read their written report on a career of their choice to the class. They are called upon by the teacher who directs the action from the back of the room. Besides several attempts to keep the class disciplined she helps two students to correctly pronounce unfamiliar words in their reports and asks several questions about the qualifications necessary for certain professions.

Segment: 031403 Social Studies Format: Seatwork

The children are making a chart on notebook paper listing each state and its products as displayed by a map on one of the commercial worksheets produced by the Data Bank System. The teacher walks around, checks the children's progress and answers short questions. In particular, she helps them clarify how to check the correct spelling of the state names but asks them to use dictionaries and maps only after they have completed the charts. Students who have not finished the assignment at the end of the period are asked to take it home for completion.

7. Teacher-High Feedback. The teacher provides correct answers and makes diagnostic comments to children individually or in groups. This occurs many times throughout the segment. The teacher-student interaction is frequent and substantial. The greater frequency and depth distinguishes teacher-high from teacher-low feedback.

In many segments coded Teacher-High there is a limited use of instructional materials. The code was often used for recitation segments in mathematics with an active teacher applying diagnostic skills to help students understand concepts and algorithms. In social studies the teacher elaborated on answers given during recitation and discussion. Students' answers were expanded leading to new ideas and questions.

The following examples show the very active teacher in segments coded as Teacher-High:

Segment: 031320 Mathematics Format: Lecture

In this lecture the teacher (a) writes on the chalkboard definitions of terms related to fractions accompanied by examples, and (b) introduces the concept of improper fractions through graphic illustrations on the

board. Students are instructed to take notes and throughout her lecture she asks related questions to make sure that they are following her. She, also, involves them in the development of the concept of improper fractions by using examples they can relate to and, again, posing questions to test their understanding.

Segment: 211124 Mathematics Format: Recitation

This recitation concentrates on high level word problems in the textbook. The problems require the application of previously learned concepts and operational skills when dealing with fractions. Some of them cover probability, pie graphs or scale drawings, topics the children are not familiar with. The teacher actively engages them during this segment posing about 50 questions in 13 minutes calling at least once on each of her students. Questions are: "How do you solve it?" "Why?" "What type of fraction?" "Numerator?" etc., while writing the suggested solution on the board. She also offers increased guidance and explanations when her students are unable to comprehend the text.

Segment: 081405 Social Studies Format: Recitation

This segment deals with issues of interpersonal problem solving. A student reads aloud a short narrative about a family's problem which is then restated by another student in his own words. The students are asked by the teacher what the problem is, how the involved persons might feel about it, why they might feel that way, and what could be done to resolve it. The teacher calls on many of his students frequently restating and expanding on their comments.

Segment: 072218 Social Studies Format: Student Reports

This class spends forty minutes of their class time on current events. Students have picked political and social issues featured in newspapers, magazines or on television (e.g. 60 Minutes) and report on it in class. Some of the topics are the peace treaty between Israel and Egypt, the army's LSD experiments with human subjects, and sports. Each report is followed by a discussion in which the teacher elicits evaluative comments from the students. She asks for instance, "How would you feel about it? Why is it important?" At one point, she makes them aware of how the peace treaty can be related to their earlier study of ancient civilizations. She, also, asks for more details to clarify issues and comments on the quality of each presentation and the material presented.

8. Not-Applicable. Feedback possibilities were not inherent in every segment. Those segments which basically required children to "take in" or listen to information without the chance for questions or clarification were coded here. Most audiovisual segments such as watching films were coded not applicable. In addition when teachers were giving instructions of a routine nature, the segments were often considered not applicable for feedback.

Segment: 063115 Mathematics Format: Giving Instruction

The teacher announces that story problems will be the focus of that day's work. She then reviews in one minute four steps to be taken leading to the solution. Three of them the children are advised to do mentally to set up the problem, the fourth step, the operation, is to be done on paper or on the chalkboard and will give the answer. The class quietly listens.

Segment: 091503 Social Studies Format: Film

In this segment the children watch a ten-minute film that is part of the MACOS material. The film "Autumn River Camp" describes the life of the Netsilik eskimos from a micro-economic point of view. The teacher alerts her students to watch closely what the eskimos are doing and how this relates to the eskimos' economic independence.

9. Textbook Only. This code assumes the textbook, workbook or worksheet to be a potential source of feedback. As such it has answers to questions, which is often the case in social studies texts, or it makes explicit illustrations of problem solutions readily available on the same or previous page in the mathematics textbook. When children work on review sections in mathematics textbooks that have indicated through page numbers where to find more information on how to solve the problem, this code applies, too. If children are using textbooks but the books do not contain explanations, illustrations or information to be used in solving problems this code does not apply.

Segment: 051123 Mathematics Format: Seatwork

The class works on a review of multiplication and division of fractions in the textbook. The problems are of varying difficulty and include reducing fractions, multiplying by a zero numerator, changing a fraction to a whole number. The review section in the textbook is subdivided according to objectives and page numbers indicate where the user can find examples showing how to do the problems. The teacher is not available for help as she decided to test each student individually with flash cards in the back of the room during this time.

Segment: 061109 Mathematics Format: Diverse Seatwork

In this segment, students are to complete a math assignment in the textbook and then go on finishing work in English and social studies. The math assignment requires the students to sum two and three fractions, changing the answers to mixed numerals. The example of how to change improper fractions to mixed numerals is given on the opposite page, while three examples of addition appear on the same page in the book. During the seatwork the teacher is sitting at her desk eating lunch. She gets up once and leaves the room for four minutes to reprimand a student. Other than that she does not interact with her students.

Segment: 031414 Social Studies Format: Seatwork

The students are doing seatwork in this segment answering questions on two teacher-made worksheets. The questions are related to the previously covered topic of the colonial government and the students are allowed to use their texts for help. The teacher walks around supervising the seatwork without talking to her students. She, also, prepares homework to be taken to an absent student.

Segment: 061205 Social Studies Format: Test

This class takes an open book social studies test on Rocky Mountain States. The teacher monitors the class eating lunch at her desk. She disregards any type of questions students pose. Instructions on what to do when finished with the test were given earlier.

Coding for Interaction (Expected)

These codes for interaction refer to the amount of student interaction expected by the teacher for the present instructional activity. Actual student interaction may not meet the teacher's expectation and is coded separately. Four levels of interaction are coded for both expected and actual interaction. The following code description refers specifically to expected interaction.

1. None. No interaction between students is expected. They are to work individually.

2. Low. Low levels of interaction are permitted. All interactions are supposed to be work related and non-disruptive. For instance, the students may occasionally whisper to their neighbors to get help on an assignment.

3. Medium. Interaction is permitted, but not necessary. The students are allowed to work together if they wish to do so. They are free to talk to one another. Some students may work by themselves, others will work together and openly communicate.

4. High. Interaction between students is expected. It is required for the instructional activity. This code is typical for group work.

Coding for Options

Options refer to choice with regard to what to do and with regard to the timing of activity. A teacher may assign a task, but tell the children it may be done at any time during the day. A teacher may assign a task and expect it to be done by all children at a given time. A teacher may assign a task which can be done in a variety of ways and allow the child choice regarding the specific way to do it. A teacher may allow a child to select from a variety of tasks and/or to decide on the order of the tasks they pursue. These various possibilities are covered in the following categories.

1. Teacher Control-Task and Timing. The teacher assigns a task to be done at a specified time. These tasks can include a small amount of student choice like which of three explorers to write about.
2. Teacher Control-Task. The teacher assigns a task, but allows the child to decide the time when to do it, within limits.
3. Student Control-Task and Time. The child selects a task from a variety available and decides when to do it or the order he/she will follow.
4. Student Control-Task. The child selects a task from a variety available to be done at a teacher specified time.
5. Student Control-Materials. The child selects materials for a teacher assigned task at a specified time. The task may be, for example, free reading or doing research for a social studies report.
6. Teacher-Task, Student Materials-Time. The child selects the materials for a teacher assigned task and decides when to do it.
7. Student Control-Order. The child decides the order in which to do tasks which are teacher assigned in a given time block.

8. Individualized Programming. The child moves at his/her own rate through a set of objectives which are teacher prescribed. The objectives may be reached through a variety of tasks chosen by the child.

Coding for "Options When Done"

This code refers to options the child has when he/she has finished the assigned tasks.

1 = No The child has no options: he/she must wait and do nothing until the teacher starts a new activity or assigns another task.

2 = Yes The child can pursue a number of specified tasks.

The specified tasks are categorized in the following way:

1 = options are related to the subject taught;

2 = options are unfinished work in any subject matter;

3 = non-academic games;

4 = reading;

5 = other;

6 = none.

Coding for Group Quality

The code definitions for group quality are based on Gump (1967).

1. Whole Class. This code applies when the whole class is operating as one group. Individualized seatwork is coded here.

2. Sectioned. The class is divided into groups with all groups working on the same task. Teacher supervision is given to all groups.

3. Subgroup/Interdependent. The children are in a face-to-face group and are interacting. They may be listening to one another or working on a common project. The group size may be as small as two children.

4. Subgroup/Private. The class is divided into groups with all groups working on different tasks. The children within each group are not working together. For example, the teacher leads a recitation session with one group of children while the rest of the class, which may be one or several groups, is doing seatwork. This situation is usually found in math classes with intraclass ability grouping. Diverse seatwork segments sometimes provide another example.

Coding for Student Location

1. Desks. The students are at their desks or designated seating arrangements. This code applies, also, to situations in which chairs and desks have been moved to facilitate the viewing of films and the like.

2. Work Tables. The students are working at work tables.

3. Floor. The students are working on the floor.

4. Rug. The students are working on the rug.

5. Office. The students are working in an office, alcove, laboratory, or other attached yet distinct room.

6. Hall. The students are out in the hallway working on some task.

7. Area. The students are working in classroom areas that are permanently set up as activity centers, such as reading libraries, game centers, living rooms, etc.

8. Blackboard. The students in this segment are at the blackboard.

9. Blackboard-Desk. One or more students are at the blackboard, while the remainder are at their desks, or any other designated work area.

10. Around Room. The students may be seen in all or in combinations of the above locations. The code is often applied during instructional situations calling for diverse seatwork or individualized seatwork.

11. Library. The students are at the library or media center outside the classroom.

12. Resource Center. The students are at the resource or special learning center outside the classroom.

13. Other Class. The students are in another classroom.

14. Other. The students are at a location not described by any of the above codes.

STUDENT OBSERVATION CODES   24 January 1979

I. OFF CATEGORIES

off - student is daydreaming, wandering around etc.

soff- student is interacting with one or more peers about non-learning related matters.

w - student is not finished but is waiting for the teacher to begin or continue the lesson or for teacher feedback.

ws - student is not finished and is socializing while waiting for the teacher to begin or continue the lesson or for teacher feedback.

fw - student is finished the assigned task and is quietly waiting for the rest of the class to finish.

fws- student is finished the assigned task and is socializing while waiting for the rest of the class to finish.

oth - student is engaged in a learning task which has not been assigned and which you do not think the teacher would permit if he/she was aware of it eg. student is doing math during a social studies lecture.

II. ON CATEGORIES

on - student is listening attentively, participating in recitations/discussions, working alone on the assigned task etc.

r - student is readying himself for the task eg. getting out materials or putting them away.

gxs - student is providing assistance to another student(s).

xs - student is receiving help from another student(s).

sson- student is cooperating with one or more students on a task. (Also use when you can't tell whether gxs or xs is the more appropriate code.)

scomp-student is comparing progress, grades etc. with another student(s).

dt - student voluntarily seeks clarification,assistance, or feedback from the teacher during a non-recitation class period. Combine the dt code with the w code if the student is simultaneously waiting. (Includes handraising during non-recitation class periods.)

rt - student receives clarification,assistance, or feedback from the teacher during a non-recitation class period.

tc - student 'teaching' class; reading report; organizing activities etc.

xm - student voluntarily seeks or uses extra material resources for the task ie. resources over and above those strictly necessary for the completion of the task.

rtxm - student is simultaneously receiving individual help from the teacher and is using extra materials.

rtxs
or
rtgxs - student is simultaneously receiving teacher help and is helping or being helped by another student.

rtxmxs
or
rtxmgxs- student is simultaneously receiving teacher help, using extra materials, and helping or being helped by another student.

xmxs
or
xmgxs - student is simultaneously using extra resources and is helping or being helped by another student.

finalt - student has finished the assigned task and has taken the initiative to begin another permitted task.

permalt- student has not finished the first task but has switched to another permitted task.

Classroom Description 0111

CLASSROOM DESCRIPTIONS

The school in which this classroom is found is located in a predominately black, low-income southern suburb of Chicago. The classroom occupies a building not originally designed as a school but recently converted into classrooms for 1st through 7th grades. This classroom like others in the renovated building is separated from adjoining classrooms by walls which do not reach the ceiling. Noise travels in this school and the teacher and children in this classroom are often distracted by noise from other classrooms. Another feature of the room is that it is situated on the inside of the building -- hence there are no windows.

The students' desks are arranged in a large U-shape. A blackboard flanked by bulletin boards takes up one wall space. Mrs. A. uses the blackboard frequently for recitations and children come over from their desks and sit on the rug in front of the blackboard. This class of 22 children, 16 boys and 6 girls is the lowest tracked 5th grade classroom based on overall performance on a battery of achievement tests. For math instruction, Mrs. A. divides the children into three ability groups: Group A (the lowest), Group B (middle), and Group C (highest). Observations were conducted over a span of seven consecutive math periods in a two-week period. Math instruction was regularly scheduled from 10:16 - 11:16, Monday, Tuesday, Thursday, and Friday and from 11:15 to 11:55 on Wednesday. Mrs. A. adhered to this set daily schedule.

Mrs. A. teaches most subjects to her class; approximately eleven of the students attend a supplementary math lab three times a week during the regularly scheduled math period.

Mrs. A. follows a set pattern with respect to math instruction. She begins the period with the organization of students into their respective ability groups. During this time, Mrs. A. assigns seatwork to two of the groups and begins a recitation with the other group in front of the blackboard. She often uses a group choral pattern of responses during the recitation. If there is time she will circulate to another math group and begin a recitation or review of their work. During the time of observation, students in Group C were working on fractions, adding and subtracting fractions and changing fractions to their common denominators. These students often practiced these skills using assignments in their math textbook and workbook, Mathematics for Individual Achievement (Houghton Mifflin, 1974). Math Group B worked on multiplication problems e.g., multiplying three digit numbers while the lowest ability group, Group A, practiced simple multiplication tables with flashcards. Practice sessions with the flashcards were often conducted in pairs with one child showing the card and the other saying the tables.

Comments

Considering the many difficulties e.g., the low math ability and easily distracted behavior of many of the students, the constant backdrop of noise, the windowless "closed in" atmosphere of the classroom, Mrs. A. manages her classroom quite well during math instruction. She gives the children individual attention, seems aware of individual needs, and gears

the instruction to the abilities of the students in a challenging way. She overcomes the handicap of noise by constantly circulating and talking to the students at close range rather than trying to talk over the noise. Although some of the students had difficulty working independently on seatwork assignments when Mrs. A. was busy with another math group, she is aware of their difficulties and will often firmly reprimand these students.

Classroom Description 0112

School 112 is located in a building not originally designed as a school but recently converted into classrooms for first through seventh grades. The community in which this school is found is a predominately black low-income suburb on the far south side of Chicago.

Classrooms in this school were separated by wall partitions which allowed noise to travel easily between classes. Mrs. A., the classroom teacher, remarked in the teacher interview that she and the students found the noise distracting. The students' desks were usually arranged in a U-shape, although Mrs. A. changed the seating for certain subjects. For social studies group activities the desks were pushed together into clusters of five or six. The windowless classroom was sparsely equipped with materials. There was one globe and a few extra sets of reading materials on book shelves. The room lacked a dictionary or reference books e.g., a encyclopedia set. A blackboard covered one wall.

The group of twenty-two students were the lowest tracked 5th grade class based on overall performance on a battery of achievement tests. Mrs. A. taught most subjects to the students. Half of the class attended a supplementary math lab three times a week.

Social studies instruction was scheduled on Tuesday and Thursday for a forty-minute period in the early afternoon. This classroom was observed for three instructional days during a two-week period.

Mrs. A. assigned one social studies project which students worked on in small groups for two of the three days of observation. They were asked to select some aspect of Black History and find magazine articles related to the topic. They were also expected to write a summary about the articles. The cognitive level intended by Mrs. A. was at a higher level than that achieved by the students. The assignment involved locating and summarizing information. However, most of the groups spent their time clipping and pasting articles.

On the other day of observation, Mrs. A. led a whole class recitation on the nature of rules and laws in preparation for a small group discussion of dilemmas involving rules and laws e.g., "What would you do if you found someone's lunch money?" Mrs. A. asked students to pretend that they were lawyers and make a group decision about how to resolve the question. The expected cognitive level of the activity was high (application) but was not consistently achieved. Some of the groups approached the discussion seriously but most of the groups socialized.

Mrs. A. was a vigilant, concerned teacher. She constantly circulated among the groups checking their progress with these activities. However, there was a discrepancy between what Mrs. A. wanted the students to experience and what actually took place during the group work activities. This may be due to the difficulties inherent in this classroom situation, the constant backdrop of noise, the "closed-in" atmosphere of the room, the paucity of materials, and the low ability of the students. The directions for these tasks may have needed to be more specific. In spite of the situation, Mrs. A. managed the class effectively.

Classroom Description -- 0211,0213

The middle school 021 is located in a conservative white working class neighborhood on the southwestern edge of Chicago. Classes 0211 (15 boys, 15 girls) and 0213 (17 boys, 11 girls) were observed during mathematics for nine consecutive days in a two week period.

Both classes were instructed by Mr. B., a science teacher, who taught mathematics for the second year without any professional preparation in this subject area. Since the classes were heterogeneously grouped they shared the same curriculum. Operations with whole numbers, addition, subtraction and multiplication of fractions, reducing, cancelling, and changing fractions to mixed numerals were skills practiced in the two week observation period. The emphasis was on drill and practice of basic skills. Algorithms were stressed while concepts were largely ignored. The textbook Investigating Mathematics (Addison-Wesley, 1973) was only used once in class 0213. Usually, the students solved problems in the workbook which accompanied the text, on commercial and teacher made worksheets or they copied problems from the blackboard. The blackboard was in this classroom being used during recitation, correcting of homework, and contests.

The seating arrangement was such that five single desks in six rows faced the chalkboard in front. The teacher's desk stood centered in the back of the room.

Though the classes were in agreement with district policy and heterogenously grouped, Mr. B. identified class 0213 as being slower in learning and accomodated his instruction to the needs of the students. That is, he tried to be more patient with them, offered more help and at one time chose a paper folding exercise suggested in the textbook to help students understand the concept of equivalent fractions.

Mr. B. exhibited the same teaching style in both classes. Very little time was spent on seatwork, written work was nearly always assigned as homework which was checked in class the following day. The teacher would write the answers on the chalkboard and students would mark their answer sheets before handing them in. Sometimes this pattern was modified to the extent that students worked out the problems on the chalkboard. Special attention was paid to each student having brought the completed homework to class. Much time was spent on recitations introducing new algorithms and reviewing previously learned skills involving teacher and/or students at the chalkboard. Frequent quizzes and contests focused on skill practice, Mr. B.'s major emphasis of instruction. Most of the activities were short and required much student-teacher interaction leaving the impression of an active classroom with high student engagement.

External motivation was provided through the superstar system: the names of each month's ten highest achieving students were officially read in class and put up on the bulletin board. The classroom atmosphere was competitive and achievement oriented. For instance, girls competed against boys in having the best homework, or the left row competed against the right in speed of performing basic mathematical skills. A variety of contests were held and children seemed to like them. Complying with the

administration's demand for a disciplined, industrious classroom atmosphere the students had to keep quiet and look into an open book of any type when finished with an assignment or during transition periods.

Classroom Description 0212, 0214

School 021 is a middle school located in a white working class neighborhood in the southwest suburbs of Chicago. Most members of the community are employed as skilled laborers. They have a high school education and in some cases two years of college. The families could be typified as being "middle American." Teaching basics and discipline is highly valued by this community and emphasized in the school.

The middle school, grades 5-8, adheres to a tracking system of core A, upper track, and core B, lower track. According to reading achievement the students are delegated to either track within which all the courses are taken. Within the cores the students are distributed heterogeneously. As the school is departmentalized, we observed two classes of social science both taught by Mr. C.

During fourth period Mr. C. taught 11 boys and 11 girls (class 212) and during eighth period 18 boys and 12 girls (class 214). Observations for class 212 took place on nine consecutive days and yielded 9 x 45 minutes or 405 total observation minutes. Class 214, however, did not gather for social studies, due to an assembly, on the fifth day of observations, thus, we obtained only 360 observation minutes of sequential data.

Mr. C. has eleven years of teaching experience out of which eight years have been spent at the present school. His educational background embraces History, Philosophy (B.A.), and School Administration (M.A.). He prefers a formal teaching approach, hence, the student's desks are arranged in rows facing his desk and the blackboard. According to school policy, students have to stay in their desks and be occupied all the time. Before class starts or when finished with an assignment they will work on tasks from other subjects or read books and magazines that are available in the room.

The teacher indicated the textbook Homelands of the World (Globe Book Co., Inc., 1977) as the curriculum chosen by a committee in the district. The text is accompanied by a 62 page workbook emphasizing factual knowledge, map skills, and graphical representation of data. Homelands of the World addresses the interrelatedness and interdependency of all countries. Through comparing and contrasting of information the students are helped to recognize the common and individual problems of all human societies. The book features short story-like contributions which are well illustrated with photographs, maps, charts, and diagrams. Exercises requiring factual recall as well as higher mental processes conclude major topics.

In both classes, Mr. C. was working on chapter four, Latin America, when observed. He covered the chapter page by page including enrichment exercises, and employed the exercise segment and the workbook to practice new skills and concepts. Higher level processes were not emphasized. Other instructional materials included maps, films, filmstrips, dictionaries, and encyclopedias during a library visit. The instructional pattern quite often showed activities which lasted the entire period. During seatwork, the most

frequent activity, students read silently in their textbook, worked on the exercises, or gathered information for their report. Also, a short trial test, made up by the teacher, was taken and afterwards corrected in class. While the class was silently working Mr. C. sat at his desk supervising and helping students when they approached him. During the two recitations (30-40 minutes) children read orally from the textbook, and the teacher interspersed mostly factual questions. A film on Latin America's geography and a filmstrip on rubber production pertained to the subject matter.

Comments

Mr. C.'s classes were well disciplined. Interaction between students was nearly zero. The teacher kept a low profile during all instructional activities, staying mostly seated at his desk. As he mentioned in the interview, he used many ways to introduce the students to the subject matter, however, on several occasions it seemed that he failed to reach integration. E.g., the film was outdated and did not catch students' attention. The viewing of the film was not prepared and not followed up by the teacher. Poor preparation on the teacher's part resulted in one incident in which students repeated two exercises in the book. Both classrooms may be described as being pedestrian. They were congruent in regard to curriculum and instructional pattern with the eighth period, class 0214, presenting more disruptions due to the lateness of the day.

Classroom Description 0311

The elementary school 311 is located in a lower class neighborhood in the southern suburbs of Chicago. It serves grades K-6, is non-departmentalized but adheres to a tracking system in reading and mathematics. Mr. D., a certified reading specialist for grades K-12, taught a high, though not above grade level, mathematics class when observed for nine non-consecutive days within a 15 day period, Each period lasted for 50 minutes, (1:00 p.m. - 1:50 p.m.), thus, we obtained sequential data from 450 total observation minutes.

The desks for the 11 boys and 15 girls were arranged in two rows each on the left and right side of the room facing the teacher's desk and the black board with one row in the middle where pairs of desks were pushed together facing each other. The children had their seats assigned by the teacher.

The curriculum was largely determined by the text, Exploring Elementary Mathematics (Holt, Rinehart, & Winston, 1970), grade 5 which was chosen by the administration eight years ago. Mr. D. makes selective use of the problem sections in the book; he also employs commercial and teacher-made worksheets during his lessons. Over a week's time he built his instruction around an old Metropolitan Achievement Test preparing the children for an upcoming standardized test. During the days observed, the class was working on changing improper fractions to mixed numerals and vice versa, adding and subtracting fractions and mixed numerals with like and unlike denominators, and solving word problems.

The teacher preferred a formal teaching approach. The children spent nearly all of their time in seatwork and recitation, the amount of time doing the latter being only slightly lower than that for seatwork. The daily routine consisted of a recitation solving between 4 and 10 problems already written at the blackboard, which served as a review or as an introduction to a new concept or skill. This was followed by a recitation using problems in the text or the previous assignment. Quite often students would voluntarily work out problems on the board while the rest of the class watched or worked at their desks. Recitation was always followed by seatwork which concluded the lesson. The teacher was actively involved throughout the period; during seatwork he moved through the room and helped students, during recitation he sat at his desk or stood at the blackboard diagnosing and remedying problems of students who worked at the blackboard. He, also, worked out problems at the board sharing each step while verbalizing it.

Comments

The teacher sometimes used a mathematically incorrect terminology while explaining. Also, he concentrated on skills and not on concepts because he believed, as he expressed in the interview, that concepts were known by his high achieving math class. Thus, his explanation tended to be very mechanical and algorithmic without much substance. He shared interest in his students' success and had a lot of patience as his function as a helper indicated. This made him at times oblivious to an increasing noise level and the restlessness of other students while he was helping an individual during seatwork. Low to no off-task behavior could be registered during recitations.

Classroom Description 0312

Class 0312 belonged to an elementary school (K-6) in a lower SES suburban district. Mr. D., a reading specialist, taught all academic subjects besides mathematics. Mathematics was tracked as was reading with the latter always being taught by the homeroom teacher. The class was observed for eight consecutive days within a two week period during social studies, the last period of the day (2:45-3:30).

Mr. D.'s rather traditional teaching approach was reflected in the seating arrangement. Rows on the left and right side of the room were facing his desk while in the middle pairs of desks were pushed together facing each other. Seats were assigned by the teacher. Mr. D. usually controlled the classroom from his desk or the chalkboard.

The curriculum concentrated on a) topics connected to the Declaration of Independence, and b) map skills. The school had adopted the Databank System, Inquiring About American History (Holt, Rinehart & Winston, 1976), of which Mr. D. used only the textbook and filmstrips. In addition he employed the Map Skills Book (Scholastic Book Services, 1974) actually developed for pupils of a younger age. Students were not allowed to write in the workbooks, instead they had to trace the outlines of maps onto other paper before completing them.

The instructional pattern consisted largely of recitation and seatwork. On two occasions, filmstrips about the Boston Tea Party were shown followed by a short recitation and clarification of new words and concepts. One trial test was administered during the observations. Questions on the chalkboard had to be answered in a couple of sentences. The correct answers were identified during a recitation session the next day.

Workbook and textbook were used during recitation and seatwork. Usually, a student would read a paragraph aloud while the others silently followed and the teacher would clarify and/or inquire about new terms and concepts. Sometimes, Mr. D. would draw parallels from the past to the present, but he did not require the students to actively contrast the two realities. The seatwork concentrated on explaining new terms, answering questions in the books, and completing or reading simple maps. Throughout the observations, history and map skills were taught as two separate entities built into one instructional period.

Comments

The classroom was structured but friendly. The teacher tended to ignore students' misbehavior. Overall, students behaved fairly well in this classroom but off-task behavior increased, as our observers noticed, when Mr. D. tried to compare the past with the present. Then, the recitation got a flavor of lecture in that the teacher digressed too much expressing his own views on social and political issues and failing to engage the students in critical thinking. The latter was identified by him in our interview as his objective. He never reached it -- his instruction covered only the two lowest cognitive levels. The disconnectedness of practicing map skills and learning about American history was also problematic.

Classroom Description 0313

Ms. E.'s mathematics lessons took place in a K-6 elementary school located in a low SES neighborhood of suburban Chicago. Though reading and mathematics were tracked for fifth-graders they only left their homerooms for mathematics. 13 boys and 8 girls went right after noon recess, from 1:00-1:50 p.m., to Ms. E.'s room for mathematics instruction. This low mathematics group was observed for nine consecutive instructional days in a period of two weeks.

The seating arrangement in this classroom was such that children were sitting in three clusters of six to eight at individual desks pushed together. Facing the entrance, the teacher's desk stood sideways against the bulletin board opposite from the chalkboard on the broad side of the room. Other furniture included open closets, three filing cabinets, a bookcase, a magazine rack and cabinets below a long window front. Two worktables and two desks separated by a divider completed the inventory.

During the time observed the students practiced operations with whole numbers such as multiplication and division, worked with number theoretical concepts such as prime numbers, factorization, rounding off and estimating, and they were introduced to terms and concepts of fractions like numerator, denominator, proper, improper, equivalent fractions, mixed numerals and reducing. Mental arithmetic was observed twice during recitation sessions.

Ms. E. made scarce use of the textbook Exploring Elementary Mathematics (Holt, Rinehart and Winston, 1970) which had been chosen nine years earlier by the district's curriculum committee composed of teachers. Instead, she relied heavily on commercial and teacher-made worksheets or put problems to be solved on the overhead projector. Her approach to teaching was a traditional one. She spent an equal amount of time on seatwork and recitation, her main modes of instruction, supplemented by two lectures introducing new concepts. While there is no pattern visible regarding the sequence of seatwork and recitation, she always started with advanced organizers, introducing the work to be done, new and familiar topics to be covered. During recitation and lecture Ms. E. made heavy use of the chalkboard and the overhead projector to go over algorithms step by step or to illustrate underlying concepts of fractions and operations with fractions. Her recitations were very lively with a high degree of teacher and student involvement. She stressed conceptual understanding and displayed effective diagnostic skills in eliminating any difficulties and misunderstandings her students exhibited in their oral or written work.

The observers noted Ms. E.'s class being at all times well disciplined and highly involved in the learning process. The teacher offered well prepared and structured lessons, always reviewing prerequisites necessary for the learning of new concepts and skills. For instance, the students reviewed multiplication, division, and prime numbers as prerequisites for factorization which itself is a prerequisite for reducing fractions, a basic skill to be mastered for further operations with fractions.

Classroom Description 0314

Ms. E. taught all academic subjects besides mathematics, which was tracked, to her homeroom of 11 boys and 14 girls, in an elementary school (K-6) located in a lower SES suburban neighborhood. The seating arrangement in this classroom was such that six or seven desks were pushed together so that students were able to work together when necessary. As the teacher indicated she would have preferred tables in her room for greater facilitation of project and group work. Her own desk was in front of the bulletin board opposite from the chalkboard or the broad side of the room.

Classroom 0314 was observed in social studies for eight consecutive days in a two week period from 2:40 to 3:25 each time.

During observations the instructional activities comprised a nearly equal amount of recitation and seatwork, employing a variety of instructional materials as prescribed by the Holt Databank System Inquiring About American History (Holt, Rinehart, & Winston, 1976). Curriculum materials available were textbook, datacards, data packs, data foldouts, worksheets, filmstrips and cassettes. The teachers' handbook indicated in a layout of each unit the teaching objectives and how to use materials in order to achieve these objectives. While observed Ms. E. relied on the textbook, lamanated data cards, maps, commercial worksheets, and teacher-made worksheets.

The topic covered was the colonization of the USA. Students spent a considerable amount of time reading graphs and maps on data cards in order to make charts on the population density of specified eastern colonies at different points in time to see the growth and direction of the settlement.

The recitations often served as an introduction to the upcoming seatwork assignment. Teaching the whole class Ms. E. asked the students to read maps, etc. and clarified technical issues at the board. Recitations were fast-paced with many short answer questions put by the teacher. Factual knowledge and concepts were stressed, higher level processes were required when children applied map skills and interpreted historic data. Subsequent lessons reviewed the seatwork from previous sessions and readings were incorporated. The teacher used many short detailed questions for recitation giving qualitative feedback often including further explanations of concepts.

The instruction always had a fast pace set by the teacher who was highly visible during seatwork moving quickly through the room, helping with and supervising her students' work. Being well organized Ms. E. gave clear instructions and diagnostic feedback in regard to assignments. She did not tolerate noise and had her students work alone most of the time. They were very attentive and well-behaved.

Classroom Description 0411

School 041, a K-8 elementary school, serves a mostly white, low middle class community in the suburbs south of Chicago. In this school, classrooms are self-contained and non-tracked: all subjects besides music, art, and physical education are taught by the classroom teachers. The school provides for students' individual differences in abilities by offering special services and programs like speech therapy, remedial mathematics, remedial reading, a gifted program, and the like. Students identified to benefit from such a program attend it once or twice a week during school hours.

In this school, classroom 0411 was observed from 9:18-10:01 for nine consecutive days in a two week period. During this time of day Ms. F., the classroom teacher, taught mathematics to her 21 students. The 12 boys and nine girls had assigned seats. Stationary desks were arranged in seven rows of four or three facing the teacher's desk which was centered in the front of the chalkboard. There was ample space between the rows allowing the teacher to move around freely and to place her folding chair next to a student's desk when individual help was needed.

The physical features of the room were pleasant. The warm colors of the walls, the window front along one wall, and the large area for display of student projects provided by three bulletin boards contributed to this impression. Teaching was facilitated by bookshelves with a variety of texts, workbooks, and extensive reference materials. Other inventory included wall maps and a SRA kit on careers on a desk in front of the room.

When teaching mathematics Ms. F. followed a curriculum guide based on the textbook Discovery in Mathematics (Laidlaw, 1972). The district wide text was accompanied by a workbook and further supplemented by the Spectrum Math Series (Laidlaw, 1971). The use of commercial worksheets, two teacher made fact sheets as well as the students' use of one calculator on two occasions were observed. Topics covered by the teacher were the units of the metric system, their conversion within the metric system, measuring with metric instruments, computing averages, factoring, reducing fractions, equivalent fractions, improper fractions, mixed numbers, and multiplication of fractions. In addition, students had assignments on addition, subtraction, multiplication and division of whole numbers, basic fraction concepts and addition of fractions.

The teacher's daily instructional pattern consisted of giving instructions, whole class or group recitations, and seatwork. The instructional pattern was influenced by the teacher's emphasis on students' independence. For instance, a variety of assignments were posted for several days on the front chalkboard and students were expected to complete them during seatwork and at home without a deadline given. Children were able to choose the pace and most of the time the order in which to proceed. Each day, the teacher spent a fair amount of time asking about the progress in past assignments and introducing new ones. Students' difficulties with assignments were dealt with on an individual or group level. During seatwork the teacher often led recitation sessions with some students at the back chalkboard to

remedy their problems in learning a new skill. Assignments were corrected in class more than a week later. Students were not held responsible if they did not have the assignment by the time of correction.

Whole class recitation was used during the correction process and when introducing new concepts and skills. Texts were employed each time. It is noteworthy that the teacher worked with the students line by line through the text and examples in the book during the introduction of new learning material.

Comments

According to our observers Ms. F.'s teaching approach was not always successful. The somewhat unstructured activities gave the impression of a disorganized, poorly managed classroom. This was especially apparent when Ms. F. worked with small recitation groups without physically creating such groups. The teacher would stay at her desk in front of the room and lead a recitation with students at the blackboard in the back of the room and with some students sitting in their assigned seats, thus talking over the main body of students doing seatwork.

Classroom Description 0412

Classroom 0412 can be found in a K-8 elementary school in a mostly white, low middle-class suburban community on the southern edge of Chicago. Ms. F., the homeroom teacher, teaches all subjects besides music, art, and physical education to the 12 boys and 9 girls in this non-tracked class. Special services and programs, e.g., speech therapy, remedial math and reading and the gifted program, provide for the individual needs of the students.

Ms. F's homeroom was observed during social studies lessons for seven consecutive days of instruction in a two week-period. Social studies was scheduled Tuesdays, Thursdays, Fridays from 12:30-1:20, and Wednesdays from 1:25-2:10.

The classroom was organized in a traditional manner with students having assigned seats. Stationary desks arranged in seven rows of four or three faced the teacher's desk which was centered in front of the chalkboard. The aisles were kept wide enough to provide space for the teacher's folding chair which she put next to a student's desk when individual help was needed. Three bookcases with a variety of text, workbooks, and extensive reference materials are underneath windows and bulletin boards. An SRA kit on careers was kept on a desk in front of the room, several wall maps, a globe, and a small collection of the National Geographic aided in the teaching process. The room was bright with water colors and ample space for display of student's work. The two chalkboards in front and back of the room were used to post daily and/or weekly assignments.

The social studies curriculum was based on the district-wide text Man and Society (Silver Burdett, 1972) chosen by a committee of teachers and school administrators. The social and ecological context of man is the focus of this text. It integrates disciplines like anthropology, sociology, economics, geography, history, and political science when contrasting past and present living conditions. During our observations the class started the book's unit on industrialism, reading about past and present ways of making iron and milling wheat. In addition, students worked on map skills and individual career projects which required them to prepare a report and a career poster (advertisement) based on research of a chosen career.

There was no daily routine observable in Ms. F's instructional approach. She varied the instructional form from one day to the next using only one or two instructional activities throughout a lesson. Thus, on some days students did only seatwork, on others recitation prevailed, and another day had only student reports. While the instructional activity stayed the same, the substantive content changed during a period. For instance, students read silently in the textbook and answered questions on iron making, followed by a worksheet on geographic terms and locations, and going on to work on their career projects. During seat work, Ms. F was very active. She moved around with her folding chair helping individual students. Recitation sessions were led by the teacher from her desk and were always text based. The teacher or a student would read a paragraph aloud followed by the teacher's questions of a factual nature. While the teacher followed the text closely she did not use any of the prescribed motivational techniques nor did she attempt any of the suggested higher cognitive objectives.

Comment

The sameness of the instructional activity did not seem to be conducive to students' motivation and learning. Disciplinary problems which arose, especially during recitation sessions, might have been avoided by a more diversified activities approach and a more coherent, goal-oriented substantive instruction.

Classroom Description 0413

This self-contained 5th grade classroom is located in a K-8 elementary school situated in a far south suburban area of Chicago. The surrounding community is a mix of predominately white, middle-income, blue and white collar families. Mrs. G., the classroom teacher, instructs the twenty-one children (eleven boys and ten girls) in all subjects except art, music, and physical education. The students are heterogeneously grouped in this classroom so a wide range of individual abilities is represented. Some of the children go out of the classroom for special services e.g., speech therapy, and remedial reading.

The classroom is organized in an open way with three clusters of seven desks grouped together. Mrs. G. calls these "learning center groups." The seating arrangement is changed frequently by the teacher to fit what she is currently doing with the students. A work table of adult height occupies the middle of the room; students often sit at this table during seatwork and while working on group projects. Mrs. G.'s desk is off to one side of the room. Several bookcases filled with reference books line the walls under the windows and bulletin board.

Math is a subject taught five times a week, on Monday and Wednesday from 9:21 to 10:01 and on Tuesday, Thursday, and Friday from 8:38 to 9:18. In general, Mrs. G. follows this set schedule. Math instruction was observed for ten consecutive school days during a two-week period.

The math period is usually broken down into three or four separate instructional segments. The pattern followed is first, a few minutes of teacher organization or transition (pledge or greeting), and then a period of recitation or review leading into seatwork. Occasionally, Mrs. G. uses the blackboard to demonstrate sample problems. In other recitation segments, Mrs. G. reads out loud from the math text, Discovery in Mathematics (Laidlaw, 1972), while students follow along, answering her questions.

The content of the math instruction was concerned with operations involving fractions, adding and multiplying fractions, finding the lowest common denominator, identifying equivalent fractions, and learning about reciprocals, a topic introduced to the students for the first time.

Seatwork assignments were made in three books, Discovery in Mathematics (Laidlaw, 1972) text and workbook and the Spectrum Math Series (Laidlaw, 1971) workbook. Students were also given several commercially prepared worksheets to complete. The worksheets required students to practice computational skills e.g., adding and subtracting four and five digit numbers or multiplying fractions, in a game format e.g., "Bingo Multiplication and Fractions." The students also played commercially prepared fraction games, Winning at Math Series (Enrich, 1978) in groups of four and five.

One noteworthy instructional practice observed in this classroom was the routine of having students check their own seatwork assignments using the teacher's edition of the text or individually prepared answer sheets which Mrs. G. made available to the students. After students completed

their seatwork assignments, they would come up to the teacher's desk where her textbook or answer sheets were located and correct their papers on their own.

Comments

Mrs. G. is an involved teacher during math instruction. She constantly circulates among the students during seatwork, checking their work. Mrs. G. usually responds to children with their hands up rather than checking all of the children's work. She does spend time with individual children going over problems at their desks or at the blackboard.

One impression about the quality of math instruction in this classroom is that is follows a somewhat haphazard rather than developmental sequence. For example, after introducing the concept of a reciprocal during a recitation, Mrs. G. switches to different content when she assigns seatwork involving multiplication of fractions. Subsequent instruction does not extend the idea of reciprocal or offer opportunities for students to practice finding reciprocals.

Classroom Description 0414

The predominately white, middle-income community in which this K through 8th grade school is located is situated in a far south suburban area of Chicago. A listing of parent occupations for the students in Mrs. G.'s 5th grade classroom suggests a mix of white and blue collar backgrounds.

Twenty-one children (eleven boys and ten girls) make up this self-contained classroom which is non-tracked. Several of the children are enrolled in special services e.g., speech therapy and remedial reading. Most subjects are taught by Mrs. G.

The students' desks are grouped together in three clusters of seven desks arranged so that they face each other. Referring to these clusters as "learning center groups" in her teacher interview, Mrs. G. changes not only the seating pattern but the arrangement of desks frequently to fit what she is currently doing with the students in the different subjects. A work table of adult height sits in the middle of the room and is used regularly by students working on their social studies group projects. Mrs. G.'s desk is pushed against a wall at the side of the room. Several bookcases filled with reference books line the walls under windows and the bulletin board.

Social studies is scheduled to be taught every day from 1:26-2:11. The actual time for social studies varies from this schedule somewhat, beginning and ending later than the scheduled time and lasting longer than forty-five minutes on some occasions. Student reports on current events occur once a week during the morning for a short, ten minute period. Social studies was observed for ten consecutive instructional days during a two week period.

Although there is some variation of the social studies period routine, Mrs. G. usually conducts instruction in a set way beginning with a short period of teacher organization or transition followed by a recitation using the social studies text, Man and Society (Silver Burdett, 1972), and ending with a seatwork assignment or group work. The subject matter covered in the ten days of observation was extremely diverse. Three major topics were considered, learning the abbreviations and locations of the states; discussing the growth of cities using information about Aztec city life, Philadelphia during the colonial period, and modern city life; and completion of individual career projects. These projects occupied a major part of the students' time; seven days were devoted to work on these projects. The project required students to research a career and prepare a folder containing information about the career. Reference materials and resources for this project were contributed to the classroom by a district wide career cooperative group which comes to this classroom once a month to find out about student interests and in turn supplies a variety of reference sources. Students had the option of working individually or in pairs on the project. The career project culminated in a whole class activity, a "career fair" during which students circulated among displays of their research and exchanged actual "goods" associated with the different careers e.g., the bakery dispensed baked goods.

Two other noteworthy activities involved redesigning an Aztec town and inventing their own rebuses for names of world countries.

Mrs. G. uses a variety of instructional modes in social studies -- contests, group work, seatwork, and student reports. This variety seems related to the diverse nature of social studies content covered and to a range of intellectual goals.

Comments

For the most part, students seem actively engaged in the diverse social studies activities in this classroom. During group work, students move around the classroom, arranging themselves in pairs at their desks and in corners of the classroom. Mrs. G. was intermittently attentive to the children's seat and group work. On some days she would circulate among the students checking individual progress and on other days she seemed preoccupied with housecleaning chores. One final comment has to do with the lack of cohesiveness between different components of the social studies curriculum. For example, no connection was made between the study of life in cities and the career project, or the study of cities and learning the location and names of states.

Classroom Description 0511

The flavor of this classroom reflects the working-class values of the surrounding community. Order, obedience, and routine are strongly emphasized by Mrs. H., who rules her homeroom class of twenty-five children with an "iron fist". The school in which this classroom is situated has an enrollment of 400 children in kindergarten through eighth grades. Mrs. H. teaches most subjects except for physical education, art and music. Mathematics is a non-tracked subject and is taught five times a week. The time of the daily math period varies from day to day, but is presented in fixed periods of forty-five minutes. Grades 4 through 8 in this school follow a daily schedule with set periods for instruction. Mrs. H. begins and ends the math period promptly at the sound of a bell which rings outside the classroom. This adherence to an external source of timing means that math instruction is often abruptly begun and ended.

The small classroom is arranged traditionally with the children's desks lined in rows, facing the front where the blackboard and teacher's desk are located. Children are assigned their seats by the teacher. In addition, a small table in the back of the room is often occupied by six or seven children from the neighboring 5th grade classroom. These children come into Mrs. H.'s classroom during math because they have forfeited their physical education period. Consequently they are engaged in make-up work while their class and teacher go to the gym. The room is cramped, especially when the extra children come into the room. This also adds to the number of children Mrs. H. must supervise.

The mathematics text used is Macmillan Mathematics (Macmillan, 1976), a book which combines colorful explanatory text with work-book type problem sections. Math skills and concepts are introduced via concrete pictures and sample problems. Skills involving multiplication and division of fractions and a review of addition and subtraction made up the math curriculum during the ten consecutive days of instruction over a two-week observational period. Math is presented in a highly routinized and unimaginative manner. The teacher organizes instruction around one major pattern -- seatwork followed by checking the seatwork. Checking work segments are handled via recitation with Mrs. H. calling on children to do problems at the blackboard. Observers noted that the same children were called on to do example problems. The teacher rarely intersperses these segments with elaboration, explanation, or review of concepts and her use of the blackboard for instructional purposes is infrequent. Furthermore, activities are often introduced abruptly with little substantive review or preparation. The quality of math instruction is mechanical and static. A teacher-made test is given each Friday on the skills or concepts covered during the week. Mrs. H. does provide children with teacher-made practice worksheets because she finds the practice problems in the text too easy for the children. Mrs. H. uses flashcards most every day for drilling children on their multiplication tables. She sets up short practice drills with children individually at the back of the room and by organizing a whole class recitation using the cards. A wall chart with scores records children's progress with their multiplication tables.

Comments

This class is often noisy and disruptive. This is somewhat understandable given the cramped space and the distracting influence of other children working in the classroom during math. At these times Mrs. H. resorts to yelling at the children or threatening them with the loss of privileges e.g., "Settle down or no gym." Sometimes her requests for order border on nastiness in the case of telling children to "shut their mouths." The teaching style of this teacher is authoritarian and is likely a result of a complex of factors including limited classroom resources, added numbers of children which she must supervise, and low motivation among the children. Math instruction is often carried out in a rote fashion without enthusiasm or interest on the part of the teacher or children.

Classroom Description 0512

The school in which Mrs. H.'s classroom is located serves grades kindergarten through 8 and has an enrollment of 400 children. The surrounding community could be characterized as ethnic, working-class. The values of order, obedience to authority, and routine are firmly upheld by Mrs. H. although she periodically struggles to keep these values in place in her classroom. The twenty-five children in her homeroom often become noisy and restless which results in Mrs. H. yelling at them.

Social studies is one of many subjects taught by Mrs. H. and is a non-tracked subject. Social studies is taught four times a week and is scheduled for a fixed forty-five minute period each day. A bell outside the class marks off the instructional periods; Mrs. H. follows this set time schedule. This classroom was observed for nine consecutive days of instruction over a two-week period.

The small, cramped classroom is arranged in an unimaginative way. Rows of desks with attached seats face the front where a blackboard and teacher's desk are located. A small table with chairs sits at the back of the room. A meager supply of outdated reference books and encyclopedias are housed on low shelves underneath the high windows. Children sit in assigned seats but during some of the social studies group activities move around the room, sit on the floor, and a few move out of the classroom to the hall and to the library. The major social studies activity was a group project drawing murals of the old west. Five unisex groups of five children spread themselves around the room and spent six consecutive instructional periods coloring murals. One or two groups made use of reference texts which was the intent of the activity as expressed by Mrs. H. in the teacher interview. For the most part, the group activity lacked focus or structure and seemed at times an aimless exercise. Mrs. H. occasionally circulated among the groups but regularly returned to her desk to do work. She provided a moderate level of guidance to groups experiencing difficulty.

Several of the children who finished the mural began copying maps of the Rocky Mountain states from their textbook, Exploring Regions of the Western Hemisphere (Follett Educational Corp., 1971). Other brief activities included oral reading from a Scholastic magazine and watching an outdated propaganda film about communism. On one day the school's two 5th grade classrooms saw a film developed as part of a federally funded self-awareness/moral development curriculum. The film portrayed two moral dilemmas which were to be discussed by the children. Mrs. H. had difficulty leading the discussion; many of her comments during the discussion segment took the form of stern reprimands about the children's behavior during the film viewing. Children may have been restless during the film because the picture quality was poor.

Comments

Social studies instruction in this classroom seemed to lack purpose and substance. The teacher seemed to have difficulty managing the children and spent a great deal of her time sternly reprimanding children for their

noisy, off-task behavior. At the same time, children received little in the way of feedback about instructional goals and processes and were left pretty much to themselves during the mural making project which most certainly required more teacher guidance than was given. In addition, the classroom seems geared to order and mechanical routine. Mrs. H. requires children to line up by sex for dismissal and children stand by their desks to read out loud.

Classroom Description 0513

The tone of this classroom and the K-8 school in which it is found reflects the working-class values of the surrounding community. Order, obedience, and strict adherence to routine are emphasized in this self-contained class of twenty-five children. Mrs. I., the classroom teacher, teaches all subjects except art, music, and physical education.

The small classroom is cramped. Rows of desks occupy most of the available space. They face the front of the room where the teacher's desk and blackboard are located. In the back of the room is a built-in storage cabinet with a sink.

The daily math period is regulated by a buzzer which signals the beginning and end of instructional periods throughout the day. Math occurs on Monday and Tuesday from 9:35-10:20 and from 8:50-9:35, Wednesday-Friday. Ten consecutive math classes were observed during a two-week period.

A regular routine is followed in this classroom. First, Mrs. I. organizes students for checking homework, sending students who have not finished their homework to a nearby 5th grade classroom where they are to complete their assignments. After these students leave, Mrs. I. conducts the checking homework routine as a whole class recitation. After this is completed, she assigns seatwork in the text, Macmillan Mathematics (Macmillan, 197[illegible]), a paperback book which combines colorful explanatory text with workbook-like problem sections. Other seatwork assignments included a teacher made worksheet and problems from the Greater Cleveland Math Series (SRA, 1965).

During the observation period students work on conversion problems of metric measurement and definition and measurement of angles using protractors. A teacher constructed test on angles was administered to the whole class during one period.

Mrs. I.'s teaching style is formal. She leads recitations at the front of the class using questions from the teacher manual. Occasionally, she illustrates problems on the blackboard. Mrs. I. has students come up to her desk for assistance during seatwork. Some of her comments to students are sharp e.g., "Come on everybody. Don't sit like bumps on logs, so lazy."

Comments

Many students in this class experienced difficulty using protractors. One reason for the difficulty was that several children did not have protractors until several days into the unit (these were to be brought from home).

Although Mrs. I. goes over textbook explanations with the students she seemed frustrated by their inability to follow her instructions or explanations. For example, during one seatwork segment Mrs. I. had students re-do problems until they solved them correctly. In this instance, additional explanation or demonstration may have been helpful.

A puzzling feature of instructional organization in this classroom was the practice of sending students who had not completed homework assignments to another classroom. These students usually missed Mrs. I.'s discussion of problems during the checking homework episodes. The fact that these students had not finished their homework suggests that they may have lacked understanding of the concepts and skills and may have been most in need of direct teacher instruction. In addition, Mrs. I. does not check the homework before sending students to the other room. Consequently, some students may leave the room for other reasons.

Despite the unimaginative way math is taught in this class, students are enthusiastic about volunteering during recitation. However, as one observer noted, "more times than not, the students answer the teacher's questions incorrectly."

Classroom Description 0514

The school in which Mrs. I.'s classroom is found serves grades K through 8 and has an enrollment of 400 children. The school is located in a working class suburb on the southwest side of Chicago. Mrs. I. teaches all subjects except art, music, and physical education to her self-contained class of twenty-five students. Social studies is a non-tracked subject and is taught four times a week in forty-five minute periods. A buzzer signals the beginning and end of instructional periods throughout the school. Mrs. I. followed this school-wide pattern of scheduling instructional periods. Social studies was observed for eight consecutive instructional days over a two week period.

The small classroom was set up traditionally with rows of desks facing the front where the teacher's desk and blackboard were located. The desks occupied most of the available floor space. The room was cramped and alternative seating arrangements were probably not feasible considering the space constraints. A meagre supply of outdated reference books and encylopedias were housed on low shelves underneath high windows. A built-in cabinet with a sink covered the back wall of the classroom. The room was equipped with a globe and a large hanging map of the United States. Students usually remained in their seats for social studies activities except when they came up to the teacher's desk to ask questions or when they presented oral reports in front of the class.

Mrs. I. conducted social studies in a perfunctory manner. Her preferred mode of instruction was whole class recitation followed by seatwork assignments in the text, Many Americans, One Nation (Bowmar/Noble, 1974). She often used questions from her teacher manual to lead recitations which resulted in a lack of spontaneity during these segments. The major unit studied was the American Civil War. Students studied this topic by reading passages in their textbooks and writing assignments using the text e.g., defining unfamiliar words. One exception to this routine was when Mrs. I. played a recording of spirituals and led a discussion about it with the students.

The students also studied dittoed maps of the United States and read articles in their current Scholastic Magazines. This reading assignment was followed by oral reports about the articles. The reports were presented in a contest format with students voting for the best presentation. This procedure was carried out with little input from Mrs. I.

Comments

In general, Mrs. I.'s teaching style seemed uninspired. Recitations lacked enthusiasm on the part of the students and the teacher. When students did respond to one discussion about slavery, the observer noted that Mrs. I. "seems to be trying to ease out of answering any more of the students' questions." On one occasion Mrs. I. seemed particularly frustrated by the class' behavior during a recitation. This was reflected in her derogatory comment to the class, "Some of your questions are stupid. Use your common sense." The feeling one gets is that Mrs. I. doesn't expect much in the way of attention or involvement from her class and unfortunately her class lived up to these expectations.

Classroom Description 0611

This self-contained, non-tracked class of thirty-one students is in a K-8 elementary school which is located on the southwest side of Chicago. The neighborhood in which the school is found is predominately middle-income.

Mrs. J., the classroom teacher, has added plants, mobiles, and displays of children's art to the otherwise typical elementary classroom environment. The students' desks were grouped around the teacher's desk in several rows. A bookcase alongside the teacher's desk contained a collection of Mrs. J.'s books which students were able to borrow. The room was equipped with three globes, a wall map of the United States, and a shelf with magazines, reference books, and several sets of outdated encylopedias. One storage cabinet was filled with a few games and manipulatives. A rug and game area occupied one small corner of the room.

Most subjects are taught by Mrs. J. Math was presented five times a week for forty minutes. Math instruction was observed for nine days over a two-week period.

The math period was usually divided into two segments, a whole class recitation during which students often responded in unison to the teacher's questions about their reading in the text, and a period of individual seatwork. Problems from the textbook, Holt School Mathematics (Holt, Rinehart, and Winston, 1974) were assigned as seatwork. Mrs. J. frequently illustrated sample problems on the blackboard during recitations. These tasks required students to practice computational skills and concepts.

Subject matter consisted of problems dealing with mixed numerals and subtracting fractions. The commutative and associative properties of addition of fractions were introduced during one recitation. A review test from the book was administered on another day.

Mrs. J. preferred to answer students' questions at her desk during seatwork activities. She seemed minimally attentive to student needs for guidance or explanation. Correcting seatwork was handled quickly with little explanation or discussion. One distinctive feature of this classroom was the practice of allowing students to throw tops in the back of the room when they had finished seatwork.

Comments

Math instruction in this classroom was conducted in a bland, routine way. A typical teacher led recitation consisted of a review of memorized procedures for solving problems. Occasionally, Mrs. J. interjected her own procedures for solving problems. For example, she described the associative property of addition as "who you hang around with -- like who you associate with," and referred to whole numbers as "elephants" and fractions as "telegraph poles."

Classroom Description 0612

School 612 serves grades K-8 and is situated on the southwest side of Chicago. This section of the city is a white, middle-income area. Mrs. J., the classroom teacher instructs a non-tracked group of thirty-one students in most subjects.

Social studies instruction is scheduled daily for a forty-minute period and was observed for eight consecutive instructional days over a two-week period.

The standard elementary classroom enviornment has been enlivened by Mrs. J. with the addition of plants, mobiles, displays of children's art, and a collection of her own books for students to use. The room was equipped with three globes, a wall map of the United States, and a shelf with magazines, reference books, and a few sets of old encyclopedias. Mrs. J. has set up an informal rug and game area in one area of the room which is used by students for thowing tops, but the room had desks in rows and was crowded.

The major portion of time was devoted to teacher led recitations based on material in the text, Exploring Regions of the Western Hemisphere (Follett, 1969). The subject matter covered the history, economics, and geography of the Pacific States. Mrs. J. often called on students to read from the text and occasionally interrupted the students in the middle of their reading to add her comments, questions, or rephrasings. Students read standing up beside their desks.

Seatwork assignments consisted of questions presented in the text at the end of a chapter. Students spent part of their time correcting papers. These segments were handled routinely with little discussion of the material. A review test from the text was given during one class period. The seatwork assignments required the students to use lower level cognitive processes of recall of specific concepts and information and classification of information using one source i.e., the textbook.

Comments

Social studies instruction in this class combined elements associated with a formal instructional structure e.g., students standing while reading, with features associated with a more relaxed classroom. For example, Mrs. J. often wandered off the subject during whole class recitations, talking about her vacations, her opinions on current events, and her personal reactions to visiting a restoration of a colonial village. Interestingly enough, students seemed more attentive to these monologues than when Mrs. J. conducted a formal whole class recitation.

Students frequently worked surreptitiously on other assignments during recitations and Mrs. J. either was oblivious or tolerant of this behavior since she did not reprimand students for doing this.

Classroom Description 0621

School 621 is located on the northwest side of Chicago, an area which is economically and racially diverse. The school serves grades K-8. This class is a combined group of thirty fourth and fifth grade students and is self-contained for most subjects although Mrs. K., the classroom teacher, does coordinate subjects and units with the other two 4th/5th grade teachers.

Thirty-seven desks were grouped into seven clusters with four desks per cluster. The remaining desks were moved into isolated spots around the room. Mrs. K. commented in the interview that students are seated according to their ability in reading and math. Blackboards covered three walls and a U.S. relief map hung above one of the blackboards. The physical condition of the classroom was somewhat shabby -- there were a few broken windows. However, the classroom was well-stocked with books and was equipped with two globes and a movie screen.

Math is scheduled daily for thirty-seven minutes and was observed for ten consecutive instructional days.

Mrs. K. has divided the students into two math groups based on ability in math as measured by achievement tests. The "Brown Book" group was considered the accelerated group and used the text, Modern School Mathematics (Houghton-Mifflin, 1972). The "Green Book" group or "slow" group, worked in the text, Heath Elementary Mathematics (Heath, 1975).

The math period was organized around the skills of the two groups. While one group waited at their desks, Mrs. K. moved to the other group and led a quick recitation (6 minutes or so) and assigned seatwork in the text. She then moved on to the waiting group and repeated the pattern of recitation followed by seatwork. Mrs. K. often had students work problems at the blackboard. The "Green Book" group solved problems dealing with averages, multiplication of three and four place numbers, and using charts. The "Brown Book" group practiced skills related to changing improper fractions to mixed numbers, multiplication of fractions, and converting fractions to decimals and percents.

For three periods the whole class worked on problems in preparation for the Iowa Ability Test which was to be administered. On one day, students used dictionaries to look up definitions of math terms. On another day, Mrs. K. lectured the whole class on how to interpret story problems. One of the goals Mrs. K. mentioned in her interview was to "make the child successful on his Iowa Test", and these review sessions seemed directly related to this goal. Following the test, the class returned to their usual pattern of math instruction.

Mrs. K. described herself as a "walker arounder" and she certainly moved around in her classroom. While students worked on seatwork assignments, she circulated among the students, stopping to check each student's work for a minute or so. She responded promptly to student's raised hands. Students were free to check with their neighbor if they had a question about the seatwork.

Classroom Description 0622

This self-contained non-tracked classroom is a combined 4th and 5th grade class of thirty students. The K-8 school in which it is located is in an economically and racially diverse area on the northwest side of Chicago. The socio-economic backgrounds of the children in the class reflect this diversity.

The physical condition of the school is rundown; there are several broken windows in this classroom. However, the room was reasonably well-equipped with reference books and materials such as a U.S. relief map, a floor map, and two globes. There was ample blackboard space. Most of the thirty-seven desks were grouped into seven clusters of four desks each. A few single desks were scattered around the room. Students have been assigned seats based on their ability in math and reading.

A thirty-seven minute period for social studies instruction was scheduled daily. This class was observed for nine instructional days during a two week period.

Geography (Heath, 1966) was the text used for social studies. Students were engaged in a study of the Western and Pacific States. Subject matter was presented in various ways, through whole class recitations in which students read from the text and were questionned by the teacher, and by viewing a filmstrip. Map reading skills were practiced in a whole class recitation involving the floor map and in seatwork activities. Some of the work with maps simply involved coloring in states while other activities had to do with putting symbols on a map, locating longitude and latitude, and making a map key. These tasks did not involve higher mental processes since students copied the symbols and features from maps in their textbook. Mrs. K. made use of the manipulatives in her classroom e.g., the floor map, relief map, and globe. At times, students became noisy and restive during recitations but on the whole they were attentive to the activities. Mrs. K.'s teaching style was to circulate actively around the room during seatwork, stopping to help students with questions.

Classroom Description 0631

This homogeneously grouped math class was composed of twenty fifth graders, some of whom come from other 5th grade classrooms. Students in the 5th grade were assigned to one homeroom but switched classrooms for math and science. The middle- and upper-middle income northside neighborhood in which the K-8 school is located is ethnically diverse. Families of Greek, Laotian, Korean, and Spanish origin have recently settled in this area. Some of the students in Mrs. L.'s math class are bilingual.

Math was taught Monday-Friday from 9:30-10:25 and was observed for ten consecutive instructional days over a two-week period.

Mrs. L. has arranged the thirty desks in fifteen clusters of two desks side by side. These clusters were placed in three rows which faced the teacher's desk and blackboard at the front of the room. Display tables, bookcases, extra desks, and a storage cabinet lined one side of the room across from a wall with two short bookcases and a teacher's closet. Classroom materials included a set of encylopedias, two science reference sets, a globe, and wall maps. Students were assigned seating for math.

A variety of instructional formats e.g., lecture, recitation, checking homework, whole-class games, and tests were used by Mrs. L. The array of formats varied somewhat from day-to-day. Typically, Mrs. L. began the math period by giving instructions and then leading a thorough checking homework sequence. Mrs. L. would call on students to read problems and if incorrect, had students write the problems on the blackboard. She would then correct their answers. Homework was collected and graded at the end of a chapter unit.

Checking homework was often followed by a short 3-5 minute lecture or a longer recitation using the text Holt School Mathematics (Holt, Rinehart, and Winston, 1974). Seatwork was often assigned for the remaining part of the period.

Games involving the whole class were scheduled on several occasions at the end of the math period. We observed both "Buzz" and "Spin the Bottle" which were fast-paced competitive drills of multiples and factors of numbers carried out by teams of students.

On one day, students worked on individual seatwork assignments from an SRA math kit. Work cards from the kit were distributed and collected by a teacher-appointed "captain" who represented each row of students. This type of activity was planned every two or three weeks after the class completed a test or unit.

Two tests, a district-wide continuous learning or mastery test and a review test from the text were administered several days apart.

The math topics covered during this period included place value with decimals, the inequality symbols, comparing and adding fractions, fractional and decimal equivalents, metrics, and geometry terms which were reviewed before the mastery test. Problems were drawn from the text and Modern Math

(Silver Burdett, 1970). Most of the problems required students to practice skills and algorithms. Students did work on story problems in their text which involved application of skills and algorithms to new situations.

Mrs. L.'s teaching style was geared to helping students understand underlying math concepts and principles. During recitations and checking homework segments, she tried to elicit reasons for students' answers e.g., "How did you think that problem through?" She organized instructional time effectively balancing individual activities such as seatwork and tests with more lively whole group contests and games. She was involved as a watcher/helper during seatwork. In addition, Mrs. L. seemed to emphasize group participation e.g., selecting students as row captains, calling on students in turn during checking homework segments, and providing opportunities for team efforts in group games.

Classroom Description 0711

Ms. V's class is part of an elementary school (K-5) in a town north of Chicago. While the school district serves a socio-economically diverse group of community members, the parents of the children observed were mostly professionals and academicians. The students of class 0711 were the top ranking math students of the fourth and fifth grades. Math and reading were the two subjects tracked in this school.

Mathematics was taught on Monday - Wednesday, 10:45-11:25, and on Friday, 9:15-10:00. Observations took place on seven consecutive days within a two-week period.

Though students were tested and grouped at the beginning of the school year, later achievement outcomes and teachers' personal judgment allowed regrouping. The observations of class 0711 are a record of such a regrouping and display the teacher's skill and effort in accommodating and integrating a group of eight new students with her "old class." This undertaking required a few curricular and instructional adaptations, as well as a change of the physical environment. After teaching for two days in a large but "impersonal" room, the teacher moved the group, 18 boys and 11 girls, back to her homeroom. She expressed to our observers that the warmth of her room made up for the slight overcrowdedness. After rearranging the room, students worked on two round tables and two rectangular tables near the chalkboard in front, or at student desks arranged in groups of four or three in the back of the room. A teacher center and a rug area were off to the side. Bulletin boards, bookshelves, bookcases, tables, and carts along the walls provided for materials and student projects.

While the new students caught up on long division of whole numbers, the old group worked on the conceptual understanding of decimals, emphasizing place value, metric measurement, and addition of decimals.

Most of the teacher's time was spent with the new students diagnosing and remediating their deficiencies in division. She very actively moved aroun the room checking the program of her students and helping when deemed necessar While the new group worked out problems on commercial worksheets, the old grou moved through the text, Mathematics Around Us (Scott, Foresman, 1975).

The teacher determined the substance and sequence of learning but students were somewhat able to select the rate of learning, though teacher press was heavy. Ms. V. constantly encouraged students to help each other and share their skills. Memorable events were when advanced students volunteered to tutor the newcomers in division.

The classroom atmosphere displayed a mutual interest in learning. Most students worked together in self-selected groups, few chose independent study. Groups of students were all over the room, a seating arrangement did not exist A low level of noise was usually present since students were interacting and assisting each other. Ms. V. managed a very active classroom, but it seemed that she always kept control of it.

Classroom Description 0712

Twenty-five students come to this classroom for social studies instruction. They represent one of the four teamed groups of 4th and 5th grade students who have self-selected this social studies group for a unit on The Year of the Child. Math and reading are tracked in this school by student performance on achievement tests while the remaining subjects are conducted in homerooms which are heterogeneously grouped.

The school serves grades K-5. A breakdown of the occupations of parents of students in this social studies group reveals socio-economic diversity. A mixture of professional families and middle and low income families is also found in the surrounding community in which this school is located. The community itself is more of a separate populous city although it is situated in a suburban area near Chicago.

The small classroom is arranged informally. Round work tables are scattered throughout the room. Bookcases placed perpendicular to walls create private nooks. A reading area equipped with a rug, large easy chair and table suggests a home-like arrangement. Several study carrels are located in one corner of the room for individual seatwork. The room has many windows.

Social studies occurs Monday through Friday between 12:45-1:45. On Fridays a wide choice of projects is routinely available. Social studies instruction was observed for eight consecutive instructional days over a two week period.

During this time students worked primarily on "Year of the Child" projects which were intended for display at a school open house. Fourth and fifth grade students selected a foreign country to use as a focus for these projects and were grouped accordingly into teams. The team in this classroom was working on projects connected with the topic of "Israel."

The format for carrying out these projects was somewhat loose and disorganized. Students had the option of working on projects independently or with others in small groups. However, many of the students meandered during the project period working intermittently on crafts type activities e.g., finger weaving, painting posters, or sewing banners.

The teacher provided little in the way of task structure, preparation, or guidance for the projects. She was available at her desk for students if they had a question but she did not actively circulate among the groups and check progress. Occasionally she intervened to help out with one of the projects or to discipline students. The classroom became quite noisy during these work sessions and some students engaged in aimless wandering and horseplay.

The overall cognitive level of these projects was low. The craft activities selected by students seemed superficially related to the arts and crafts of Israel. However, on one occasion students engaged in an activity requiring the higher mental processes of synthesis in the case of composing cinquains. This particular activity was not directly related to the Israel projects.

Comments

The teacher in this classroom seemed to have difficulty managing her class in terms of discipline and curriculum content and purpose. Observers noted much off-task behavior during the time students worked on their projects. It could be that the projects were not sufficiently organized and implemented to hold student interest over the seven day period devoted to them. It could also be the case that the time period allocated for the projects was excessive considering the nature of the project activities. In either case, actual social studies learning seemed overshadowed by the emphasis on making crafts for the school open house.

Classroom Description 0721, 0722, 0724

This non-tracked homeroom class of twenty-eight 5th and 6th grade students is located in a middle school serving 5th-8th grades. The surrounding community is a racially and economically diverse city situated in a northern suburban area of Chicago.

Math and social studies are combined in one instructional period, Monday-Friday from 10:00-10:55. Mrs. O. teaches these subjects to her homeroom class while the remaining subjects are taught by other 5th/6th grade teachers.

The spacious, well-equipped classroom is organized very informally. One area called the "living room" is used regularly for whole class discussions. This area is furnished with a rug, pillows, arm chair, spool tables, and director's chairs. Another home-like seating area is located under a bulletin board in a different corner of the room. Several work tables are scattered throughout the room.

This classroom was observed for ten instructional days over a two week period. The combined math and social studies period is routinely divided into three or four separate instructional segments. The pattern followed is first a few minutes of teacher organization or preparation, then a quick check of stock prices which are recorded by students in their files, and finally group or diverse seat work. The largest block of time is allocated to the latter activities.

A varied array of seatwork and group work activities was observed. Some students worked on group reports on ancient civilizations. For example, one group taped a debate and another group prepared a skit. Two texts, The Human Adventure (Addison-Wesley, 1976) and Ancient Civilizations (Allyn and Bacon, 1971) were used as reference books.

Students also completed commercially prepared math worksheet assignments involving graphing, calculating perimeter and area, and practicing computational skills with fractions. The math program is individualized.

Two major whole class activities were the presentation of student reports on ancient civilizations and the administration of an essay test on the question, "What is human being and what should people do while on Earth?" which was to be written from the perspective of a person from several ancient cultures. This question demanded a high level of cognitive reasoning since students were asked to make evaluations and comparisons.

Comments

This teacher's instructional style is geared to the emotional and social needs of the students. For example, in one class discussion she explored the feelings of a student who had recently lost a student election. She provides frequent, enthusiastic and positive feedback to students e.g., "Beautiful", "You did a great job." She also directs gentle reprimands to students who engage in off-task socializing when it is needed. Her classroom is usually a busy, noisy, and active one. One observor noted that this teacher provides a "cohesive, supportive atmosphere where children seemed enthusiastic about learning."

Classroom Description 0811, 0813

This classroom is located in a K-5 elementary school which is situated in an upper middle-income suburb on the northwest side of Chicago. Students in the fifth grade are tracked for math, reading, social studies, and science on the basis of standardized test scores. There are two fifth-grade classes and therefore two ability levels. Mrs. P. teaches most subjects except science which is taught by the other fifth grade teacher. Class 813 is the high track and class 811 the low.

Math instruction for the low-track group of seventeen students was scheduled from 11:00-11:45, Monday-Friday and from 2:15-3:00, Monday-Friday, for the high-track group of twenty students. Students in the 5th grade move between classrooms for instruction depending on the subject and the track to which they are assigned. Observations of eight consecutive instructional days in both math classes were carried out over a two-week period.

Mrs. P. organized instructional time and patterns in the two classes in a similar way. During math, students were given individualized assignments which meant that some students remained in the classroom while other students moved across the hall to the Math Lab or "Workshop." The Math Lab was furnished with fourteen moveable desks and chairs, two couches, and was equipped with audio-visual materials such as overhead projectors, filmstrip projectors and taperecorders with earphones as well as math kits and learning games. The spacious classroom which served as Mrs. P.'s homeroom was furnished with twenty-four moveable desks and chairs grouped in clusters of four desks. Both rooms contained many reference books, textbooks, and library books which were stored on open bookshelves. Mrs. P.'s desk was placed off to one side of the classroom. Several storage caddys were nearby for students to place worksheets.

The math curriculum consisted of an individualized program partially based on a system published by Media Research. The students moved through a sequence of self-paced learning activities which were built around units e.g., fractions, number theory, decimals, story problems, metrics, and geometry and measurement. Each unit was composed of thirty some objectives. For each objective, a set of pre- and post-test problems and corresponding practice worksheets were specified. Students worked through the objectives for each unit, taking pre-tests which diagnosed their skill levels. Mrs. P. developed assignments for each student based on the pre-tests. These consisted of listening to audio-tapes (SRA and teacher-made) in the Math Lab, reviewing problems and explanations in other math texts, and practicing skills and algorithms using teacher-made or commercially prepared worksheets. Following these activities, students took a post-test and moved on to another objective or unit.

In any given math period, students worked on a variety of these tasks. Some of the students went to the Math Lab to listen to tapes while others remained at their desks in the classroom and worked on individual seatwork assignments. The 811 math class listened to tapes and solved problems dealing with mixed and improper fractions, reciprocal fractions, and converting fractions into whole numbers. Students in the 813 class listened to tapes

and completed dittoes dealing with fractions, adding unlike fractions, reducing fractions, multiplying fractions, and multiplying and dividing 2 & 3 place numbers.

Another major activity was a "Contig" tournament which was played by groups of five students (two teams cf two and scorekeeper) in the Math Lab. Contig is a math game in which three number die are thrown and players have to select operations for a number sentence using the three numbers corresponding to a given number printed on the game board. This game required students to apply computational skills and concepts to a new situation, a higher level of cognitive process than simply practicing skills or algorithms. Students were permitted to play Contig when they completed a certain number of assignments.

Mrs. P. spent most of her time correcting worksheets and tests at her desk. Occasionally she would check students in the Math Lab. Students went to her desk for help. On several occasions, Mrs. P. worked out problems with students at the blackboard. In the 811 class, Mrs. P. wrote out individual assignments on the blackboard while in the 813 class students checked a notebook on the teacher's desk for their assignments. The high track students were also able to borrow math textbooks and take them home.

Comments

Except for some sporadic off-task socializing in both classes, the students seemed to work independently on the tasks. There was considerable interest in the "Contig" tournament and students approached these game sessions seriously. Mrs. P. was moderately involved in the classroom activities, although she often seemed occupied with work at her desk. The collected resources for math learning were very extensive.

Classroom Description 0812

The K-5 elementary school in which this classroom is found is located in a solidly upper middle-class suburban community. Students in the 5th grade are tracked on the basis of performance on standardized tests for the subjects of math, reading, social studies, and science. Students switch classrooms for instruction in these subjects. The sixteen students who come to Mrs. P.'s room for social studies represent the highest tracked group for this subject.

Social studies in this classroom occurs variably during the week: from 9-9:30 on Monday and Tuesday, from 9-9:45 on Wednesday, and from 10:30-11 on Friday. Observations of six consecutive instructional days were carried out over a two week period.

The classroom is spacious and well-equipped with books. There is ample blackboard and bulletin board space. The desks have been pushed together in clusters so that students face one another during group work activities.

The curriculum in use was the Discovery unit from the social studies simulation program, "Sailing to the New World" (Lakeside, CA: Interact, 1976). This unit consists of sequenced activities built aroung the topic of the settlement of the American colonies. The class was divided by the teacher into three groups of five or six students. Each group was designated as a colonial settlement group and was presented with the same set of questions and problems related to colonization e.g., when to sail, what to take along on the ship, where to land, how to select occupations for the colony.

Some of the activities were set up as group discussion experiences while other activities were carried out in a game format e.g., drawing cards or rolling dice or completing prepackaged worksheets from the Discovery unit. The simulation of the actual sailing was handled as a competitive contest between the three groups.

The activities presented the students with challenging and demanding problems to solve. At the time of the simulated sailing groups were given hypothetical incidents which altered the original sailing route e.g., "your ship goes off course and you are able to cover only 100 miles -- decide what ship to lose." This activity required complex problem-solving and led to higher mental processes involving revision of hypotheses in the face of new variables, analysis of conflicting strategies, and generation of alternative solutions.

In addition, the activities associated with this unit incorporated skills from other subject areas e.g., computations (math), naming the colony (language) and included variety as in the case of rolling dice, completing worksheets, and using maps.

The pattern of instruction followed a regular routine of the teacher first giving instructions or leading a preparatory recitation about the upcoming activity and then having students carry out the activity. Mrs. P. adhered to the instructional period alloted for social studies. She also tended to follow the program guidelines for this unit and supervised students closely. This type of instructional organization meant that the students stayed on task during group work episodes.

Classroom Description 0814

Mr. Q.'s classroom is in a K-5 elementary school which is located in an upper-middle income suburb on the northwest side of Chicago. Students in the two 5th grade classrooms were tracked into either a high or low ability group for math, reading, social studies, and science on the basis of achievement on standardized tests.

Class 814 which was composed of twenty-one students (12 boys and 9 girls) was the low-track social studies group. Most subjects including both tracks of science were taught by Mr. Q. The other 5th grade teacher instructed the two math sections.

The social studies period was scheduled from 9:00-9:30, Monday, Tuesday, and Wednesday and f... 10:00-10:30 on Friday. There was no social studies period on Thursday.

Collected resources in the classroom were plentiful e.g., four sets of encylopedias, atlases for each student, reference books, wall maps, globe, and learning games. These materials were stored in cabinets or on open shelves. The teacher's desk was positioned at the front of the room. The students' desks were arranged in five rows of five desks each facing the front. A stool was moved from the back of the room to the front for role-playing.

Social studies instruction was extremely varied during the seven consecutive instructional days of observation. Mr. Q. employed many instructional formats e.g., demonstration, recitation, filmstrip, contests, seatwork, role-playing, discussion, quiz, student reports and lecture. This variety corresponded to the range of topics covered.

For example, on three non-consecutive instructional days, students worked on map skills and concepts. One day seatwork was assigned in the workbooks, Map Skills for Today (Xerox, 1975) and Expanding Table and Graph Skills Book (Weekly Reader, Xerox, 1978). A whole class recitation about the geography of North and South America followed this activity. These activities were geared to receiving and practicing skills. Other activities included a teacher-led demonstration of Mercator projection with the atlases and a whole class contest using flashcards of state outlines.

Four periods were devoted to a "family conference" project which was initiated by students role-playing family conflict episodes from the social studies text, Windows on Our World (Houghton-Mifflin, 1976). Brief, five-minute role play episodes alternated with short teacher-led recitations concerning the family issues and problems. Following this activity, students were assigned a written seatwork activity which required them to draw and discuss a problem from their own family experience. This assignment was extended during short 1½-2 minute oral reports of these papers which were presented by individual students to the whole class. Interspersed between the seatwork activity and reports was a filmstrip and recitation one day about Abraham Lincoln's Birthday which was to be celebrated. A short quiz on maps was administered.

Mr. Q. managed this class effectively. His questionning during the role-play and student reports seemed to be focused on higher level cognitive processes. He tried to involve students in thinking about applying skills and concepts to new situations e.g., "What will be said at this family conference? What else might be said?" Some of the discussion during the reports was teacher-sided -- not too many students participated. This may have been due to the personal nature of the reports and students' reluctance to have their own family problems discussed in front of the whole class. Mr. Q. was an active watcher/helper during seatwork and quiz activities. He circulated around the room, checking each student's progress seat by seat rather than responding to raised hands.

Classrcom Description 0911

Located in an upper-middle class suburb this self-contained classroom for most subjects is one of three 5th grade classrooms in a K-5 elementary school.

Since math is one of the few tracked subjects, some of the children switch rooms for math instruction. Thirty children participated in Mrs. R.'s math group. The math period was usually scheduled between 9 and 10 o'clock. Math in this classroom was observed for seven, consecutive instructional periods over a 2 week period.

The math curriculum used is an individualized, developmentally sequenced program designed by the district math specialist. The program consists of workbooks on eleven math units covering four general areas: fractions, linear measurement using metrics, geometry, and mixed operations. The workbooks are designed to be autotelic; children work through self-instructional questions and algorithms at their own pace and use an answer key to check their answers. The program is set up so that children conference frequently with their math teacher about their progress and take pre and post tests. Speed tests are also given to asses children's computational skills.

Children in this classroom worked in five different workbooks covering decimals, geometry (angles and graphing), and mixed operations with fractions. The problems for the most part involved practice of computational and graphing skills. Several of the children used metric sticks, rulers, yardsticks, and trundle wheels.

The daily instructional pattern consisted of individual seatwork essentially unsupervised by the teacher. A few of the children worked with partners on some of the graphing problems. During seatwork, children were called to the teacher's desk for one-minute "mini-conferences." Progress in the workbooks was quickly checked by the teacher and noted in her record book. Occasionally, she would explain a problem to a child or work a problem on the board. Some of the children took tests in the library.

The teacher led one recitation on the rules of adding and subtracting fractions with the entire class.

Comments

Observers noted several incidents involving children's behavior during seatwork. Two children were reprimanded by the teacher for silliness with rulers and were required to place cardboard blinders around their desks. A few children spent their time reading books or daydreaming. The teacher seemed oblivious to off-task behavior during seatwork, focusing her attention on children coming to her desk. The face-to-face arrangement of desks set up for group work may not be compatible with individual seatwork activity.

Classroom Description 0912

This self-contained classroom located in an upper-middle class suburb, is one of three 5th grades in an elementary school (K-5). Mrs. R., the teacher, has twenty-five children (12 girls, 13 boys) in her classroom for most subjects. Social studies is a non-tracked subject.

Observations were carried out over eight consecutive instructional days during a 2 week period. The time for social studies was changed from an afternoon to morning period, 10:15-11:30, to accomodate the observers. This time was shortened on two days of observation.

Mrs. R. used a variety of modes of instruction: recitation, films, seatwork, group work, reports, and games. Each social studies period was broken up into smaller, varied units of activity. There was no set, daily pattern for social studies instruction.

The classroom was arranged somewhat informally with children's desks pushed together in groups of four or five spread around the room. The teacher's desk was off to the side. Mrs. R., in the teacher interview said that this arrangement maximized the overall room space and enabled children to work easily with partners. This arrangement seems compatible with the curriculum used in this classroom, MAN: A COURSE OF STUDY (MACOS) (Education Development Center, 1970) which emphasizes group discussion and problem-solving.

Topics from the (MACOS) unit on Netsilik Eskimos, their hunting practices and use of tools, were presented via teacher-led discussion, reading in MACOS pamphlets, films, and games. Children were assigned both individual seatwork projects as well as group work activities.

Several major group work activities occured. One group project focused on the question of "how does a slow-moving, dull-toothed creature capture a caribou." Children discussed this question together and made reports to the class. Another activity was the "Caribou Hunt Game," a MACOS designed board game. During the game sessions, Mrs. R. would circulate among the groups answering questions and monitoring the game playing. Children spread themselves around the room and hallway when playing the two versions of the game. A worksheet was passed out after the game for children to complete in their groups.

Many of the individual and group assignments from the MACOS curriculum required children to use higher mental processes of analysis, synthesis, and evaluation. For example, children were asked to design an Eskimo tool, analyze their game strategies, and discuss a hypothetical episode involving predation in the artic.

Comments

The teacher and children seemed very involved in the activities, particularly the Caribou Hunt Game. The children did experience some difficulty understanding the rules of the second, more complex version

of the game. Mrs. R. attempted to help them but seemed a little confused herself. She did say in the interview that she found MACOS challenging but was still learning how to use it. (This was her first year in the district and her first year using MACOS.) Mrs. R. seemed sensitive to the children's responses to the curriculum topics. For example, before a graphic sequence in one of the films, she stopped the projector and talked about the upcoming part, explaining the meaning of hunting to Eskimo people. She also provided frequent opportunities for class discussion and review of concepts and questions.

Classroom Description 0913

This classroom, located in a K-5 elementary school in an affluent, North Shore suburb, serves as a homeroom for twenty-six children. Mrs. S., the homeroom teacher, teaches most subjects to the same group of children except math and reading which are tracked. Consequently, students switch for math instruction four mornings a week. Approximately 14 children comprise Mrs. S.'s math group although as many as 20 children were observed in the classroom on one day. (No reason was given for the increase.) The math period is usually scheduled between 9 and 10 o'clock. Seven consecutive days of math instruction were observed over a two week period. Mrs. S.'s math class was identified as the low track group in the teacher interview. Mrs. S. stated that many of the children in this group have learning disabilities but their specific conditions were not identified.

The classroom is arranged informally, with a large open rug space underneath the blackboard occupying one corner of the room. Children's desks are grouped together in clusters so that some of the desks face or are side by side one another. This arrangement creates a large table-like space. These desk clusters are spread around the room. Two study carrel units stand off to one side of the room. The teacher's desk is built into a wall cabinet. Large windows look out on to a forest preserve. The overall impression of the room is one of space and light.

The math curriculum used in all of the 5th grade classrooms is a district designed, developmentally-sequenced program. Skills and concepts in four general areas, fractions, linear measurement using metrics, geometry, and mixed operations are presented in eleven math units. Each unit is organized around a self-instructional workbook, worksheets and pre- and post-tests.

Mrs. S. divided the children into two groups for math instruction. One group of children worked on problems in their workbooks while sitting at their desks or at the study carrels. Another smaller group of children met with Mrs. S. on the rug area for recitation. The children in the seatwork situation met one by one with Mrs. S. at the beginning of the period and individual goals in the workbook were assigned. Children then proceeded to solve problems while Mrs. S. moved over to the rug area. Mrs. S. would occasionally check back with the seatwork group, but usually for disciplinary rather than instructional purposes. Children working at their desks were free to pair up but this, along with the seating arrangement, may have contributed to the frequent socializing and off-task behavior. The children in the seatwork situation worked on problems involving long division while the children in the rug group solved algorithms involving fractions. During the rug group activity, Mrs. S. would call on one child to do a problem on the board while the rest of the children solved the problem at their "seats" on the rug. The cognitive level of both units involved the practice of computational skills. A few children from the rug group took a post-test and graduated to the seatwork group.

On two days of observation, the group as a whole worked together on math problems in Scholastic Magazine. These problems focused on converting ounces to pounds and calculating weight decreases and increases. The teacher said that the use of Scholastic Magazine problems was suggested by the district math specialist.

Mrs. S. was extremely vigilant during the individual seatwork segments involving the class as a whole. Her assistance to children was characterized by one observer as being "high press" -- she closely monitored children and offered direct explanation, encouragement, and guidance. This is somewhat in contrast to her supervision of the individual seatwork during the time when she was also involved in recitation with the rug group.

Classroom Description 0914

Social studies is one of the many subjects Mrs. S. teaches to her homeroom class of twenty-six children. The classroom is located in a K-5 elementary school. The surrounding community is an affluent northern suburban area. Social studies was re-scheduled from an afternoon to morning period to accomodate the observers who spent eight consecutive instructional days over a span of three weeks in the classroom. Social studies usually occured between 11:00 and 11:30; one exception was a period lasting an hour and a half. Social studies was presented three to four times a week.

The children's desks are arranged in clusters scattered around the room. Some of the clusters have six or seven desks pushed together while others are smaller groupings of three desks. The placement of desks offers children opportunities to work side by side and across from one another, a feature compatible with group work activities requiring face to face interaction. Two rug areas occupy opposite corners of the room. The teacher's desk is built into a large wall panel of cabinets and drawers. Two study carrels, which were not used during social studies, stand off to one side of the classroom. A large expanse of windows look out on a forest preserve. The overall impression of the room is one of light and space.

The curriculum used in this classroom is Man: A Course of Study (MACOS) (Education Development Center, 1970), a pre-packaged program of study units built around the question "What is human about human beings?". A series of information and reading pamphlets, films and exercises make up each unit. The MACOS curriculum emphasizes problem-solving, formulation of hypotheses, and synthesis of data. The unit of Netsilik Eskimos was the focus of study during the time of observation. Several topics were presented via varied formats -- discussion, recitation, group work, seatwork, films, and reading.

The daily pattern of activities was not routinized; there was a great deal of variability in the day-to-day instruction. Some of the days were broken up into several different types of activity e.g., discussion, recitation, group work, films, while other days (usually the shorter periods) had one or two large blocks of activity e.g., recitation followed by seatwork.

Two major group activities took place. These activities were noteworthy because they involved higher mental processes of synthesis and evaluation of information. For example, children were asked to design an Eskimo sled and create an Eskimo amulet. Children were well-prepared for embarking on these projects; in each case discussion, films or specific preparation by Mrs. S. preceeded the tasks. Children also practiced map reading skills while working in pairs on worksheets which required them to interpret a map of Artic migration patterns. Observation notes indicated that children formed their own groups for projects assigned as group work or work with pairs. During group activities, children moved around the room, locating themselves in the desk clusters and on the rug. Mrs. S. is almost never at her desk. She constantly circulates among the children during group work and seatwork. Occasionally she leaves the room for a few minutes during group work but is moderately vigilant of children having difficulty with assignments.

Comments

On two occasions, Mrs. S. reprimanded the class on their behavior. One of these episodes occured during a read through of a play. This particular instructional sequence seemed loosely structured with the goals of the activity not clearly defined. Also, there was little preparation for the rehearsal other than children were to practice the scripts. This activity was not realized as a class production of the play during the time of observation.

Classroom Description 2111

The middle school 211 is located in a wealthy suburban community north of Chicago. Community members have academic or professional degrees and are interested in providing a quality education for their children. The district makes a wide range of material resources, a math consultant, and two preparation periods available to their teachers. The middle school operates a well staffed and equipped learning center as well as an impressive computation facility. All fifth graders are introduced to basic computing skills on microcomputers. Gifted and accelerated students have additional access to a federally funded math lab in the learning center. Twice a week, during mathematics lessons, they receive special instructions. Students who are below the district specified achievement level in math get once a week individual help from one of the math lab aides.

The 13 boys and 16 girls in class 2111 were half of the school's top ranking math students. In accordance with the formal seating arrangement, they sat alphabetically alternating by sex in five single rows of desks facing the front chalkboard in their room. Behind them was a teacher center with a desk, a table, and a file cabinet in front of a second chalkboard and a bulletin board. The room was pleasant and spacious with a variety of resources stored in shelves and cabinets underneath the windows and another bulletin board.

Mathematics lessons were observed for nine consecutive days in a 2-1/2 week period. All lessons were approximately 45 minutes long. The time of day varied from morning to afternoon due to a change in schedule.

The teacher adhered to the curriculum guidelines established by a committee of teachers and the math consultant. Content, objectives, and a time table for each unit were specified to allow coordination with the learning center. Enrichment activities were provided for fast learning students. During the time observed, Ms. T. reviewed the concept of fractions, fractions in proper and improper form, equivalent fractions, mixed numerals, and reducing. The multiplication of fractions by fractions, whole numbers, and mixed numerals was introduced and practiced. The teacher followed closely the district adopted text, Scott, Foresman Mathematics (Scott, Foresman, 1980) and the accompanying workbook. Much care and effort went into the conceptual development of the subject matter. Illustrations and diagrams in the book were discussed; additional graphic representations were put on the chalkboard for further explanations. The class spent considerable time on applying conceptual understanding of fractions to complex problem solving tasks.

While observed, the class took one test on concepts of fractions. Other classroom activities concentrated on recitations and seatwork. Recitations, used for the development of conceptual understanding and introduction of new skills, were usually followed by seatwork enabling the students to practice the new skills. Correcting homework was a nearly daily activity since homework had to be done every day except Friday. Usually, the teacher would read off answers and have the students correct their own papers, collecting them afterwards. A few times, students would give the answers and explain their work at the chalkboard.

Though the teacher was always available for help at her desk during seatwork, she had set up extra time after school once a week for remediation. There was time for work and time for play in this classroom. When done with the assignment, students were allowed to read or play games. If they behaved well throughout the week, the class played Math Bingo on Fridays. Overall, this class was well functioning and students seemed to enjoy the lessons.

Classroom Description 2112

The middle school 211 is located in a suburban community just north of Chicago. Most community members have academic and professional degrees and are on the upper end of the income scale. The school has a wide range of material and personal resources available for teachers and students. An example is the well-planned learning center with computer facilities geared toward the talented student which is also useful for remedial work.

In this school, Ms. T.'s non-tracked, self-contained homeroom was observed for nine consecutive social studies lessons in a 2½ week period. Social studies was always taught in the morning but the days and hours of scheduling were kept flexible. The length of the lessons observed range from 15 to 24 minutes.

Ms. T.'s oblong classroom was bright and spacious and, like the school, made a variety of resources available to students. Texts and reference materials were stored in shelves and cabinets underneath the windowfront and a bulletin board. Students' desks were arranged in five single rows facing the blackboard in front, the narrow side of the room. A teacher center with a table, file cabinet and desk was located behind the students' desks next to the corridor door along a wall equipped with chalkboards and another bulletin board. A puppet stage and a card table in the back as well as two work tables in front completed the inventory.

During the first 3½ days of observations careers were the focus of the curriculum. Following instructions on commercial worksheets, the students searched the local newspapers for want ads with night or day jobs, service or non-service jobs, high and low income jobs, etc. This activity was supplemented by a film addressing the issue of educational preparation, working conditions, and type of reward in relation to various jobs. Teacher led recitations based on the film and assignments followed but resulted only in exchange of information.

The lessons following dealt with the history of the American government addressing historical as well as civic issues. The first 13 states, the constitution, the three branches of government and their functions were covered. These lessons were based on the textbook The Social Sciences: Concepts and Values (Harcourt, Brace, Jovanovich, 1970), the source of the district's social studies curriculum. The book was exclusively used during recitation sessions. Students would read aloud and answer questions of mostly higher cognitive nature put by the teacher and text.

Ms. T.'s class spent about one third of instruction time on recitation, one third on seatwork, and one fifth on films. However, the teacher did not display a daily instructional pattern. Ms. T. used a variety of instructional techniques and means. At one time she brought in three parchment replicas of colonial documents and discussed them with her students. Another time she had each student research a different historical topic or person and write a paragraph about it which was presented in class. Aside from the career project she used short activities that kept the students'

momentum. Her text oriented instruction was supplemented by four films or filmstrips. Each film was prepared and followed up by a short recitation session. The teacher would point out things the students should look for and give guiding questions. Later she asked for what they saw and what their impressions were of the film.

Ms. T. was very much in tune with her students. Our observers noted that students liked to interact with her during seatwork when she circled around the room. She showed the ability to attend to students' individual needs. During the student reports she always found something in the report to compliment about. At times, e.g., during the career recitations, students seemed to be bored and a little restless but never created any serious discipline problem.

Classroom Description 2113

Class 2113 observed is in a middle school in a wealthy suburb north of Chicago. Most parents have academic or professional degrees and show interest in their children's education. The district provides its middle school teachers with a wide range of material resources, a math consultant, and two preparation periods a day. The school operates an excellently staffed and equipped learning center as well as an impressive computation facility. The latter serves all fifth graders in acquiring some basic computing skills on microcomputers. A federally funded math lab for gifted and accelerated students is in the learning center. Twice a week, during mathematics lessons, students identified through a testing program at the beginning of the year receive special instructions fostering their talent. Children behind in reaching set learning objectives in math may go once a week to obtain individual help from one of the math lab aides.

Ms. U.'s classroom gives testimony of the school's spaciousness and its abundance of resources. There are plenty of blackboards, bulletin boards, cabinets and shelves with instructional materials along with audio-visual equipment. A special feature is a sound proof backroom facilitating group or project work through a large hexagonal table in the center. In the main room girls and boys sit at desks in single or double rows, changing with the teacher's preference. The number of students, 23, attending Ms. U.'s self-contained classroom increased by one during the eleven consecutive days of mathematics and social studies observation within a 2½ week period. Usually, the self-contained classroom allowed a high degree of flexibility in scheduling and time allocation which the teacher made extensive use of, going so far as to integrate both subjects when deemed beneficial. However, as Ms. U. mentioned during her interview, this flexibility was restricted during the time of observation.

The observed math lessons ranged from 40-55 minutes in length. They were oriented around curriculum guidelines set forth by a committee of teachers and the district's math consultant. The guidelines include content, objectives, and a time table for each unit. The time table is reinforced by the consultant. Students are tested at the beginning and end of each unit. Those students getting 98% or more right answers on the pretest will work on a somewhat individualized program covering the same topic as the class at a higher level of difficulty. During the observations four students were working on such packages in the back room. They needed little or no assistance from the teacher following the instructions on worksheets, in the text or in the workbooks and comparing their answers with the keys laid out on a designated table in the main room. The rest of the class worked with the teacher on the same topics at a lower level. Comparing fractions, reducing, changing to mixed numerals and adding fractions or mixed numerals with like and unlike denominators was the content covered. The teacher made extensive use of the text <u>Scott, Foresman Mathematics</u> (Scott, Foresman, 1980) and the accompanying workbook. Homework was part of the students' responsibility and consisted in the completion of the assigned seatwork in class. Though students were to correct their work using the available keys in the answer corner, the teacher showed a daily pattern of correcting and grading homework through exchange of students'

papers as the first activity in the math lessons. This was often followed by introduction of a new algorithm in a recitation or task preparation format, leading to the written assignment.

The teacher did not teach any concepts but taught algorithms step by step. During seatwork Ms. U. was very active intensively helping individual children which led, however, to sometimes rather long lines of children waiting for assistance. Children were very involved during recitations, but less so during seatwork and the correcting of homework.

A game "In-Out" played twice represented a task at a high cognitive level, the generating of a rule, and triggered excitement as well as involvement on the students' part.

Classroom Description 2114

The middle school 211 is located in a wealthy suburban community north of Chicago. Class 2114 was observed during social studies lessons for eleven consecutive days[1] in a 2½ week period. The self-contained classroom allowed the teacher flexibility in scheduling of and time allocation to subjects taught, thus the observed lessons lasted from 8 to 67 minutes.

Ms. U.'s classroom reveals the school's spaciousness and its abundance of resources. The friendly, bright room has plenty of chalkboard and bulletin board space; shelves and cabinets are filled with teaching and reference materials. Audiovisual equipment is kept in a sound proof backroom that has as its center a large hexagonal table used for group and special project work. The main room has 24 desks arranged in single or double rows facing the chalkboard. The number of students increased from 23 to 24 during the period of observations.

The teacher followed the district wide curriculum in social studies based on the text The Social Sciences: Concepts and Values (Harcourt, Brace, Jovanovich, 1970, 1975). The textbook was accompanied by a workbook both of which had been piloted by Ms. U. and other teachers before being adopted by a committee of teachers. As Ms. U. indicated to our observors, the text was more a supplier of teaching ideas and learning activities than a reader. It was not a collection of facts but stimulated thinking, Ms. U.'s most highly valued teaching objective. The books were supplemented by commerical and teacher made worksheets, maps, newspapers and other reference materials from the classroom and the school's extensive learning center.

While observed the class learned about economics, civics, and geography of the United States. The book led the class into issues of micro and macro economics connecting personal, state, and federal levels. It started out with a discussion of costs and profit involved in keeping a store, moved on to taxes and then to state and federal income -- how it was earned and how it was spent. Students did research on the departments of the federal government and on cabinet members. Their findings were reported in two class sessions. One individual research project called for a written report on a chosen state covering geographic, civic, and economic aspects.

The teacher did not exhibit a daily pattern of instruction but it is noteworthy that seatwork was the major learning activity. It usually called for individual projects over a couple of days and seemed to be more stimulating and at a higher cognitive level when compared to other classroom activities such as recitations, student reports, or tests. During seatwork Ms. U. circulated the room and got very involved helping students individually. At times this resulted in several students waiting in line for her assistance. An activity at a high cognitive level triggering much enthusiasm was the game "In-Out" requiring students to generalize and establish a rule.

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[1] An extra day was observed because one day had an 8 minute period which was ended when a police officer came to talk to the class.

While observed the teacher twice integrated social studies and mathematics. Displaying the sources of and their fractional contributions to the government's income with a pie graph, the class made the fractions equivalent for reasons of comparison. At another time the class figured out costs and profits for a storekeeper.

Table D.1

GROUP PATTERNS AND OCCUPANCY TIME
SECOND YEAR MATH INSTRUCTIONAL SEGMENTS

US27	US23	US24	US25	US70	US31	NUMBER	PERCENT	SUMOCC	OCCPC
TEACHER	RECITATION	WATCH/HELP-INT	BB-WATCH	CONCEPTS, SKILLS	NONE	1	0.19	880	0.59
TEACHER	RECITATION	WATCH/HELP-CONT	BB-SOLVE	CONCEPTS, SKILLS	NONE	1	0.19	126	0.08
TEACHER	RECITATION	WATCH/HELP-CONT	BB-SOLVE	CONCEPTS, SKILLS	LOW	1	0.19	270	0.18
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	FACT, KNOWLEDGE	NONE	1	0.19	480	0.32
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	CONCEPTS, SKILLS	NONE	45	8.43	11368	7.57
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	CONCEPTS, SKILLS	LOW	2	0.37	420	0.28
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	APPLICATION	NONE	2	0.37	701	0.47
TEACHER	RECITATION	RECITATION LDR	READ/ORAL	FACT, KNOWLEDGE	NONE	1	0.19	625	0.42
TEACHER	RECITATION	RECITATION LDR	READ/ORAL	CONCEPTS, SKILLS	NONE	3	0.56	1237	0.82
TEACHER	RECITATION	RECITATION LDR	SOLVE/DESK	CONCEPTS, SKILLS	NONE	14	2.62	6141	4.09
TEACHER	RECITATION	RECITATION LDR	SOLVE/DESK	APPLICATION	NONE	1	0.19	588	0.39
TEACHER	RECITATION	RECITATION LDR	BB-SOLVE	FACT, KNOWLEDGE	LOW	1	0.19	192	0.13
TEACHER	RECITATION	RECITATION LDR	BB-SOLVE	CONCEPTS, SKILLS	NONE	19	3.56	7118	4.74
TEACHER	RECITATION	RECITATION LDR	BB-WATCH	FACT, KNOWLEDGE	NONE	2	0.37	1074	0.72
TEACHER	RECITATION	RECITATION LDR	BB-WATCH	CONCEPTS, SKILLS	NONE	37	6.93	9752	6.49
TEACHER	RECITATION	RECITATION LDR	BB-WATCH	CONCEPTS, SKILLS	LOW	2	0.37	423	0.28
TEACHER	RECITATION	RECITATION LDR	BB-WATCH	APPLICATION	NONE	2	0.37	436	0.29
TEACHER	RECITATION	RECITATION LDR	CHORAL	CONCEPTS, SKILLS	NONE	8	1.50	2196	1.46
TEACHER	RECITATION	RECITATION LDR	TEST	FACT, KNOWLEDGE	NONE	1	0.19	480	0.32
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	CONCEPTS, SKILLS	NONE	4	0.75	547	0.36
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	APPLICATION	NONE	3	0.56	768	0.51
TEACHER	RECITATION	RECITATION LDR	VARIETY	CONCEPTS, SKILLS	NONE	2	0.37	240	0.16
TEACHER	RECITATION	RECITATION LDR	VARIETY	CONCEPTS, SKILLS	LOW	2	0.37	411	0.27
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	CONCEPTS, SKILLS	NONE	1	0.19	460	0.31
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	APPLICATION	HIGH	1	0.19	200	0.13
TEACHER	LECTURE	RECITATION LDR	LISTEN	FACT, KNOWLEDGE	NONE	1	0.19	90	0.06
TEACHER	LECTURE	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	6	1.12	1095	0.73
TEACHER	LECTURE	INSTRUCTOR	LISTEN	CONCEPTS, SKILLS	NONE	5	0.94	1073	0.71
TEACHER	DEMONSTRATION	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	1	0.19	90	0.06
TEACHER	DEMONSTRATION	INSTRUCTOR	GRAPHS	CONCEPTS, SKILLS	MED	1	0.19	224	0.15
TEACHER	DEMONSTRATION	INSTRUCTOR	MANIP	CONCEPTS, SKILLS	NONE	1	0.19	224	0.15
TEACHER	CHECK WORK	RECITATION LDR	QUEST/ANS	FACT, KNOWLEDGE	NONE	1	0.19	175	0.12
TEACHER	CHECK WORK	RECITATION LDR	BB-WATCH	CONCEPTS, SKILLS	NONE	1	0.19	360	0.24
TEACHER	CHECK WORK	RECITATION LDR	CHECK WORK	FACT, KNOWLEDGE	NONE	8	1.50	1670	1.11
TEACHER	CHECK WORK	RECITATION LDR	CHECK WORK	FACT, KNOWLEDGE	LOW	1	0.19	242	0.16
TEACHER	CHECK WORK	ACTION DIRECTOR	CHECK WORK	FACT, KNOWLEDGE	NONE	10	1.87	2156	1.44
TEACHER	CHECK WORK	READER	CHECK WORK	FACT, KNOWLEDGE	NONE	19	3.56	3862	2.57
TEACHER	CHECK WORK	READER	CHECK WORK	FACT, KNOWLEDGE	LOW	1	0.19	300	0.20
TEACHER	CHECK WORK	READER	CHECK WORK	CONCEPTS, SKILLS	NONE	1	0.19	168	0.11
TEACHER	TEST	TESTER	TEST	FACT, KNOWLEDGE	NONE	2	0.37	414	0.28
TEACHER	TEST	TESTER	TEST	CONCEPTS, SKILLS	NONE	2	0.37	112	0.07
TEACHER	CONTEST	RECITATION LDR	QUEST/ANS	HI MENT PROCESS	NONE	1	0.19	240	0.16
TEACHER	CONTEST	ACTION DIRECTOR	SOLVE/DESK	CONCEPTS, SKILLS	NONE	4	0.75	1830	1.22
TEACHER	CONTEST	ACTION DIRECTOR	BB-SOLVE	CONCEPTS, SKILLS	NONE	7	1.31	2618	1.74
TEACHER	CONTEST	ACTION DIRECTOR	CONTEST	CONCEPTS, SKILLS	NONE	1	0.19	52	0.03
TEACHER	CONTEST	ACTION DIRECTOR	CONTEST	CONCEPTS, SKILLS	MED	1	0.19	500	0.33
TEACHER	GIVE INSTR	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	7	1.31	388	0.26
TEACHER	GIVE INSTR	ACTION DIRECTOR	LISTEN	FACT, KNOWLEDGE	NONE	9	1.69	670	0.45
TEACHER	GIVE INSTR	ACTION DIRECTOR	LISTEN	FACT, KNOWLEDGE	LOW	2	0.37	152	0.10
TEACHER	GIVE INSTR	ACTION DIRECTOR	LISTEN	CONCEPTS, SKILLS	NONE	1	0.19	68	0.05
TEACHER	GIVE INSTR	ACTION DIRECTOR	READY/T	FACT, KNOWLEDGE	NONE	3	0.56	392	0.26
TEACHER	PREPARATION	RECITATION LDR	QUEST/ANS	FACT, KNOWLEDGE	NONE	2	0.37	222	0.15
TEACHER	PREPARATION	RECITATION LDR	BB-WATCH	CONCEPTS, SKILLS	NONE	1	0.19	80	0.05
TEACHER	PREPARATION	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	6	1.12	480	0.32
TEACHER	PREPARATION	ACTION DIRECTOR	LISTEN	FACT, KNOWLEDGE	NONE	1	0.19	85	0.06

GROUP PATTERNS AND OCCUPANCY TIME
SECOND YEAR MATH INSTRUCTIONAL SEGMENTS

US27	US23	US24	US25	US70	US31	NUMBER	PERCENT	SUMOCC	OCCPC
CHILD	SEATWORK	NOT IN	SOLVE/DESK	FACT, KNOWLEDGE	NONE	2	0.37	19	0.01
CHILD	SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	NONE	39	7.30	8444	5.62
CHILD	SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.19	400	[illegible]
CHILD	SEATWORK	NOT IN	READ/SILENT	FACT, KNOWLEDGE	NONE	1	0.19	29	0.02
CHILD	SEATWORK	NOT IN	CRAFTS	APPLICATION	MED	1	0.19	105	0.07
CHILD	SEATWORK	NOT IN	MANIP	CONCEPTS, SKILLS	NONE	1	0.19	152	0.10
CHILD	SEATWORK	NOT IN	GAME-COG	CONCEPTS, SKILLS	NONE	1	0.19	26	0.02
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	NONE	64	11.99	24774	16.49
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	11	2.06	4047	2.69
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	MED	1	0.19	700	0.47
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	APPLICATION	NONE	2	0.37	874	0.58
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	APPLICATION	LOW	1	0.19	361	0.24
CHILD	SEATWORK	WATCH/HELP-INT	CRAFTS	FACT, KNOWLEDGE	LOW	1	0.19	108	0.07
CHILD	SEATWORK	WATCH/HELP-INT	MANIP	APPLICATION	LOW	1	0.19	154	0.10
CHILD	SEATWORK	WATCH/HELP-INT	GAME-COG	CONCEPTS, SKILLS	MED	1	0.19	207	0.14
CHILD	SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	CONCEPTS, SKILLS	NONE	5	0.94	2291	1.53
CHILD	SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	2	0.37	576	0.38
CHILD	SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	CONCEPTS, SKILLS	MED	1	0.19	280	0.19
CHILD	SEATWORK	ACTION DIRECTOR	SOLVE/DESK	CONCEPTS, SKILLS	NONE	2	0.37	396	0.26
CHILD	SEATWORK	ACTION DIRECTOR	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.19	84	0.06
CHILD	DIV SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	NONE	2	0.37	339	0.23
CHILD	DIV SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.19	841	0.56
CHILD	DIV SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	NONE	4	0.75	1198	0.80
CHILD	DIV SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.19	270	0.18
CHILD	DIV SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	MED	1	0.19	140	0.09
CHILD	DIV SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	CONCEPTS, SKILLS	NONE	1	0.19	693	0.46
CHILD	DIV SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.19	1036	0.69
CHILD	DIV SEATWORK	WATCH/HELP-CONT	MANIP	CONCEPTS, SKILLS	LOW	1	0.19	580	0.39
CHILD	INDIV SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	NONE	3	0.56	526	0.35
CHILD	INDIV SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	MED	9	1.69	1114	0.74
CHILD	INDIV SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	NONE	31	5.81	7935	5.28
CHILD	INDIV SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	5	0.94	3938	2.62
CHILD	INDIV SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	MED	2	0.37	987	0.66
CHILD	INDIV SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	CONCEPTS, SKILLS	NONE	8	1.50	5704	3.80
CHILD	INDIV SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.19	420	0.28
CHILD	TEST	NOT IN	TEST	CONCEPTS, SKILLS	NONE	3	0.56	1370	0.91
CHILD	TEST	WATCH/HELP-INT	TEST	CONCEPTS, SKILLS	NONE	2	0.37	1069	0.71
CHILD	TEST	TESTER	TEST	CONCEPTS, SKILLS	NONE	9	1.69	4719	3.14
CHILD	TUTORING	NOT IN	TUTOR	CONCEPTS, SKILLS	LOW	1	0.19	18	0.01
COOPERATIVE	SEATWORK	NOT IN	GAME-COG	CONCEPTS, SKILLS	MED	1	0.19	416	0.28
COOPERATIVE	SEATWORK	NOT IN	GAME-COG	CONCEPTS, SKILLS	HIGH	1	0.19	135	0.09
COOPERATIVE	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	MED	3	0.56	268	0.18
COOPERATIVE	DIV SEATWORK	WATCH/HELP-INT	MANIP	CONCEPTS, SKILLS	HIGH	1	0.19	102	0.07
COOPERATIVE	DIV SEATWORK	WATCH/HELP-INT	VARIETY	CONCEPTS, SKILLS	MED	1	0.19	429	0.29
COOPERATIVE	GROUP WORK	NOT IN	CRAFTS	APPLICATION	HIGH	1	0.19	156	0.10
COOPERATIVE	CONTEST	NOT IN	GAME-COG	CONCEPTS, SKILLS	MED	2	0.37	1020	0.68
COOPERATIVE	CONTEST	NOT IN	GAME-COG	CONCEPTS, SKILLS	HIGH	1	0.19	80	0.05
COOPERATIVE	CONTEST	WATCH/HELP-INT	GAME-COG	CONCEPTS, SKILLS	MED	15	2.81	1481	0.99
COOPERATIVE	CONTEST	WATCH/HELP-INT	GAME-COG	CONCEPTS, SKILLS	HIGH	7	1.31	1185	0.79
COOPERATIVE	CONTEST	WATCH/HELP-INT	GAME-COG	APPLICATION	HIGH	1	0.19	155	0.10
COOPERATIVE	CONTEST	ACTION DIRECTOR	CONTEST	CONCEPTS, SKILLS	HIGH	3	0.56	200	0.13
COOPERATIVE	PREPARATION	RECITATION LDR	QUEST/ANS	CONCEPTS, SKILLS	LOW	1	0.19	112	0.07
COOPERATIVE	TUTORING	NOT IN	TUTOR	CONCEPTS, SKILLS	HIGH	1	0.19	8	0.01
COOPERATIVE	TUTORING	WATCH/HELP-INT	TUTOR	CONCEPTS, SKILLS	HIGH	2	0.37	165	0.11
COOPERATIVE	TUTORING	WATCH/HELP-CONT	TUTOR	CONCEPTS, SKILLS	HIGH	4	0.75	189	0.13

GROUP PATTERNS AND OCCUPANCY TIME
SECOND YEAR SOCIAL STUDIES INSTRUCTIONAL SEGMENTS

US27	US23	US24	US25	US70	US31	NUMBER	PERCENT	SUMOCC	OCCPC
TEACHER	SEATWORK	ACTION DIRECTOR	MAPS	SYMBOLIC	NONE	1	0.18	841	0.62
TEACHER	SEATWORK	ACTION DIRECTOR	GRAPHS	CONCEPTS, SKILLS	NONE	1	0.18	216	0.16
TEACHER	SEATWORK	READER	SOLVE/DESK	FACT, KNOWLEDGE	NONE	1	0.18	192	0.14
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	FACT, KNOWLEDGE	NONE	17	3.12	3989	2.93
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	FACT, KNOWLEDGE	LOW	3	0.55	666	0.49
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	CONCEPTS, SKILLS	NONE	13	2.39	4744	3.48
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	APPLICATION	NONE	3	0.55	957	0.70
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	HI MENT PROCESS	NONE	2	0.37	1272	0.93
TEACHER	RECITATION	RECITATION LDR	QUEST/ANS	SYMBOLIC	NONE	4	0.73	821	0.60
TEACHER	RECITATION	RECITATION LDR	READ/ORAL	FACT, KNOWLEDGE	NONE	3	0.55	2198	1.61
TEACHER	RECITATION	RECITATION LDR	READ/ORAL	CONCEPTS, SKILLS	NONE	5	0.92	4523	3.32
TEACHER	RECITATION	RECITATION LDR	AV/REC	FACT, KNOWLEDGE	NONE	1	0.18	196	0.14
TEACHER	RECITATION	RECITATION LDR	AV/READ	FACT, KNOWLEDGE	NONE	2	0.37	305	0.22
TEACHER	RECITATION	RECITATION LDR	LISTEN	APPLICATION	NONE	1	0.18	160	0.12
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	FACT, KNOWLEDGE	NONE	16	2.94	6577	4.83
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	FACT, KNOWLEDGE	LOW	1	0.18	400	0.29
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	CONCEPTS, SKILLS	NONE	11	2.02	6199	4.55
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	APPLICATION	NONE	4	0.73	1433	1.05
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	APPLICATION	LOW	1	0.18	260	0.19
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	HI MENT PROCESS	NONE	2	0.37	220	0.16
TEACHER	RECITATION	RECITATION LDR	Q/A-O/READ	SYMBOLIC	NONE	6	1.10	2944	2.16
TEACHER	RECITATION	RECITATION LDR	VARIETY	CONCEPTS, SKILLS	NONE	1	0.18	378	0.28
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	FACT, KNOWLEDGE	NONE	3	0.55	535	0.39
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	CONCEPTS, SKILLS	NONE	4	0.73	1058	0.78
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	CONCEPTS, SKILLS	LOW	2	0.37	369	0.27
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	APPLICATION	NONE	2	0.37	450	0.33
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	APPLICATION	MED	1	0.18	625	0.46
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	HI MENT PROCESS	NONE	2	0.37	6[illegible]2	0.18
TEACHER	DISCUSSION	RECITATION LDR	DISC/LIS	HI MENT PROCESS	LOW	3	0.55	280	0.21
TEACHER	DISCUSSION	INSTRUCTOR	DISC/LIS	HI MENT PROCESS	NONE	2	0.37	232	0.17
TEACHER	LECTURE	INSTRUCTOR	AV/REC	CONCEPTS, SKILLS	NONE	1	0.18	440	0.34
TEACHER	LECTURE	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	5	0.92	679	0.50
TEACHER	LECTURE	INSTRUCTOR	VARIETY	FACT, KNOWLEDGE	NONE	1	0.18	756	0.56
TEACHER	DEMONSTRATION	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	1	0.18	391	0.29
TEACHER	DEMONSTRATION	INSTRUCTOR	MAPS	FACT, KNOWLEDGE	NONE	2	0.37	43	0.03
TEACHER	DEMONSTRATION	INSTRUCTOR	MAPS	SYMBOLIC	NONE	1	0.18	102	0.07
TEACHER	DEMONSTRATION	INSTRUCTOR	MAPS	SYMBOLIC	LOW	1	0.18	960	0.71
TEACHER	CHECK WORK	RECITATION LDR	CHECK WORK	FACT, KNOWLEDGE	NONE	7	1.28	1464	1.08
TEACHER	CHECK WORK	RECITATION LDR	CHECK WORK	FACT, KNOWLEDGE	LOW	1	0.18	120	0.09
TEACHER	CHECK WORK	RECITATION LDR	CHECK WORK	SYMBOLIC	NONE	1	0.18	350	0.26
TEACHER	CHECK WORK	READER	CHECK WORK	FACT, KNOWLEDGE	NONE	3	0.55	1358	1.00
TEACHER	TEST	TESTER	TEST	FACT, KNOWLEDGE	NONE	3	0.55	898	0.66
TEACHER	TEST	TESTER	TEST	SYMBOLIC	NONE	1	0.18	425	0.31
TEACHER	FILM/AV	WATCH/HELP-CONT	AV/REC	FACT, KNOWLEDGE	NONE	1	0.18	450	0.33
TEACHER	CONTEST	RECITATION LDR	CONTEST	HI MENT PROCESS	NONE	1	0.18	88	0.06
TEACHER	CONTEST	ACTION DIRECTOR	SOLVE/DESK	SYMBOLIC	MEO	1	0.18	105	0.08
TEACHER	CONTEST	ACTION DIRECTOR	BB-SOLVE	HI MENT PROCESS	MED	1	0.18	350	0.26
TEACHER	CONTEST	ACTION DIRECTOR	BB-WATCH	CONCEPTS, SKILLS	LOW	1	0.18	240	0.18
TEACHER	CONTEST	ACTION DIRECTOR	GAME-COG	SYMBOLIC	LOW	1	0.18	304	0.22
TEACHER	CONTEST	ACTION DIRECTOR	CONTEST	CONCEPTS, SKILLS	LOW	1	0.18	242	0.18
TEACHER	CONTEST	ACTION DIRECTOR	CONTEST	SYMBOLIC	HONE	1	0.18	440	0.32
TEACHER	CONTEST	ACTION DIRECTOR	CONTEST	SYMBOLIC	MED	1	0.18	304	0.22
TEACHER	STUDENT REPORTS	ACTION DIRECTOR	DISC/LIS	FACT, KNOWLEDGE	LOW	1	0.18	616	0.45
TEACHER	STUDENT REPORTS	ACTION DIRECTOR	LISTEN	FACT, KNOWLEDGE	NONE	2	0.37	644	0.47
TEACHER	STUDENT REPORTS	ACTION DIRECTOR	LISTEN	FACT, KNOWLEDGE	LOW	1	0.18	86[illegible]	0.63

GROUP PATTERNS AND OCCUPANCY TIME
SECOND YEAR SOCIAL STUDIES INSTRUCTIONAL SEGMENTS

US27	US23	US24	US25	US70	US31	NUMBER	PERCENT	SUMOCC	OCCPC
TEACHER	GIVE INSTR	RECITATION LDR	QUEST/ANS	FACT, KNOWLEDGE	NONE	3	0.55	390	0.29
TEACHER	GIVE INSTR	RECITATION LDR	LISTEN	FACT, KNOWLEDGE	NONE	1	0.18	110	0.08
TEACHER	GIVE INSTR	RECITATION LDR	LISTEN	FACT, KNOWLEDGE	LOW	1	0.18	105	0.08
TEACHER	GIVE INSTR	INSTRUCTOR	QUEST/ANS	FACT, KNOWLEDGE	NONE	1	0.18	75	0.06
TEACHER	GIVE INSTR	INSTRUCTOR	DISC/LIS	FACT, KNOWLEDGE	NONE	1	0.18	250	0.18
TEACHER	GIVE INSTR	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	9	1.65	1039	0.76
TEACHER	GIVE INSTR	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	LOW	2	0.37	204	0.15
TEACHER	GIVE INSTR	ACTION DIRECTOR	QUEST/ANS	FACT, KNOWLEDGE	NONE	1	0.18	253	0.19
TEACHER	GIVE INSTR	ACTION DIRECTOR	DISC/LIS	FACT, KNOWLEDGE	NONE	1	0.18	126	0.09
TEACHER	GIVE INSTR	ACTION DIRECTOR	LISTEN	FACT, KNOWLEDGE	NONE	21	3.85	2120	1.56
TEACHER	GIVE INSTR	ACTION DIRECTOR	LISTEN	FACT, KNOWLEDGE	LOW	2	[illegible]	211	0.15
TEACHER	GIVE INSTR	ACTION DIRECTOR	LISTEN	APPLICATION	NONE	1	0.18	240	0.18
TEACHER	PREPARATION	RECITATION LDR	Q/A-O/READ	FACT, KNOWLEDGE	NONE	1	0.18	96	0.07
TEACHER	PREPARATION	INSTRUCTOR	SOLVE/DESK	SYMBOLIC	NONE	1	0.18	165	0.12
TEACHER	PREPARATION	INSTRUCTOR	LISTEN	FACT, KNOWLEDGE	NONE	12	[illegible]	1960	1.44
TEACHER	STOCKS	READER	GRAPHS	SYMBOLIC	NONE	2	[illegible]	286	0.21
TEACHER	STOCKS	READER	GRAPHS	SYMBOLIC	LOW	6	[illegible]	756	0.56
CHILD	SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	NONE	2	0.37	364	0.27
CHILD	SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.18	34	0.02
CHILD	SEATWORK	NOT IN	READ/SILENT	CONCEPTS, SKILLS	NONE	1	0.18	198	0.15
CHILD	SEATWORK	NOT IN	RESEARCH	LOCATE INFO	LOW	1	0.18	60	0.04
CHILD	SEATWORK	NOT IN	VARIETY	LOCATE INFO	NONE	1	0.18	363	0.27
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	FACT, KNOWLEDGE	NONE	4	0.73	892	0.66
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	NONE	5	0.92	1818	1.34
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	2	0.37	953	0.70
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	APPLICATION	NONE	1	0.18	506	0.37
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	LOCATE INFO	NONE	1	0.18	396	0.29
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	SYMBOLIC	NONE	2	0.37	406	0.30
CHILD	SEATWORK	WATCH/HELP-INT	SOLVE/DESK	SYMBOLIC	LOW	1	0.18	210	0.15
CHILD	SEATWORK	WATCH/HELP-INT	READ/SILENT	FACT, KNOWLEDGE	NONE	2	0.37	973	0.71
CHILD	SEATWORK	WATCH/HELP-INT	WRITE	FACT, KNOWLEDGE	NONE	2	0.37	592	0.43
CHILD	SEATWORK	WATCH/HELP-INT	WRITE	CONCEPTS, SKILLS	NONE	2	0.37	918	0.67
CHILD	SEATWORK	WATCH/HELP-INT	WRITE	CONCEPTS, SKILLS	LOW	1	0.18	286	0.21
CHILD	SEATWORK	WATCH/HELP-INT	WRITE	APPLICATION	NONE	2	0.37	945	0.69
CHILD	SEATWORK	WATCH/HELP-INT	WRITE	HI MENT PROCESS	NONE	1	0.18	460	0.34
CHILD	SEATWORK	WATCH/HELP-INT	WRITE	LOCATE INFO	NONE	1	0.18	162	0.12
CHILD	SEATWORK	WATCH/HELP-INT	RESEARCH	CONCEPTS, SKILLS	NONE	2	0.37	1872	1.37
CHILD	SEATWORK	WATCH/HELP-INT	RESEARCH	LOCATE INFO	NONE	3	0.55	2254	1.66
CHILD	SEATWORK	WATCH/HELP-INT	RESEARCH	LOCATE INFO	LOW	2	0.37	1148	0.84
CHILD	SEATWORK	WATCH/HELP-INT	RESEARCH	LOCATE INFO	MEO	1	0.18	243	0.18
CHILD	SEATWORK	WATCH/HELP-INT	MAPS	APPLICATION	LOW	2	0.37	1016	0.75
CHILD	SEATWORK	WATCH/HELP-INT	MAPS	SYMBOLIC	NONE	9	1.65	6096	4.48
CHILD	SEATWORK	WATCH/HELP-INT	MAPS	SYMBOLIC	LOW	2	0.37	464	0.34
CHILD	SEATWORK	WATCH/HELP-INT	MAPS	SYMBOLIC	MED	1	0.18	520	0.38
CHILD	SEATWORK	WATCH/HELP-INT	GRAPHS	SYMBOLIC	NONE	2	0.37	600	0.44
CHILD	SEATWORK	WATCH/HELP-INT	VARIETY	CONCEPTS, SKILLS	NONE	1	0.18	380	0.28
CHILD	SEATWORK	WATCH/HELP-INT	VARIETY	NOT APPLICABLE	LOW	1	0.18	693	0.51
CHILD	SEATWORK	WATCH/HELP-CONT	SOLVE/DESK	HI MENT PROCESS	MED	1	0.18	132	0.10
CHILD	SEATWORK	WATCH/HELP-CONT	RESEARCH	LOCATE INFO	LOW	1	0.18	240	0.18
CHILD	SEATWORK	WATCH/HELP-CONT	GRAPHS	SYMBOLIC	NONE	1	0.18	986	0.73
CHILD	SEATWORK	ACTION DIRECTOR	READ/SILENT	CONCEPTS, SKILLS	NONE	1	0.18	432	0.32
CHILD	DIV SEATWORK	NOT IN	SOLVE/DESK	CONCEPTS, SKILLS	NONE	2	0.37	442	0.32
CHILD	DIV SEATWORK	NOT IN	RESEARCH	LOCATE INFO	NONE	5	0.92	876	0.64
CHILD	DIV SEATWORK	WATCH/HELP-INT	SOLVE/DESK	CONCEPTS, SKILLS	LOW	1	0.18	375	0.28
CHILD	DIV SEATWORK	WATCH/HELP-INT	WRITE	APPLICATION	LOW	1	0.18	28	0.02

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US27	US23	US24	US25	US70	US31	NUMBER	PERCENT	SUMOCC	OCCP
CHILO	DIV SEATWORK	WATCH/HELP-INT	RESEARCH	LOCATE INFO	NONE	3	0.55	1221	0.90
CHILO	DIV SEATWORK	WATCH/HELP-INT	CRAFTS	NOT APPLICABLE	HICH	2	0.37	598	0.44
CHILO	DIV SEATWORK	WATCH/HELP-INT	OTHER	CONCEPTS, SKILLS	MEO	1	0.18	44	0.03
CHILO	DIV SEATWORK	WATCH/HELP-INT	VARIETY	FACT, KNOWLEOCE	NONE	2	0.37	1026	0.75
CHILO	DIV SEATWORK	WATCH/HELP-INT	VARIETY	LOCATE INFO	LOW	1	0.18	480	0.35
CHILO	DIV SEATWORK	WATCH/HELP-CONT	CRAFTS	NOT APPLICABLE	LOW	1	0.18	588	0.43
CHILO	DIV SEATWORK	WATCH/HELP-CONT	CRAFTS	NOT APPLICABLE	HICH	3	0.55	1405	1.03
CHILO	DIV SEATWORK	WATCH/HELP-CONT	VARIETY	CONCEPTS, SKILLS	MEO	1	0.18	242	0.18
CHILO	TEST	NOT IN	TEST	FACT, KNOWLEOCE	NONE	1	0.18	147	0.11
CHILO	TEST	TESTER	TEST	FACT, KNOWLEOCE	NONE	1	0.18	575	0.42
CHILO	TEST	TESTER	TEST	CONCEPTS, SKILLS	NONE	1	0.18	1222	0.90
CHILO	TEST	TESTER	TEST	HI MENT PROCESS	NONE	1	0.18	1800	1.32
CHILO	TEST	TESTER	TEST	SYMBOLIC	NONE	1	0.18	286	0.21
CHILO	STUOENT REPORTS	NOT IN	OISC/LIS	NOT APPLICABLE	LOW	1	0.18	18	0.01
CHILD	STUDENT REPORTS	RECITATION LDR	OISC/LIS	FACT, KNOWLEOCE	LOW	1	0.18	1120	0.82
CHILO	STUDENT REPORTS	ACTION OIRECTOR	LISTEN	FACT, KNOWLEOCE	NONE	9	1.65	3707	2.72
CHILD	STUOENT REPORTS	ACTION OIRECTOR	LISTEN	FACT, KNOWLEOCE	LOW	2	0.37	1062	0.78
CHILD	STUOENT REPORTS	ACTION OIRECTOR	LISTEN	APPLICATION	NONE	2	0.37	703	0.52
COOPERATIVE	SEATWORK	NOT IN	MAPS	SYMBOLIC	HICH	1	0.18	110	0.08
COOPERATIVE	SEATWORK	WATCH/HELP-INT	WRITE	CONCEPTS, SKILLS	MEO	1	0.18	621	0.46
COOPERATIVE	DIV SEATWORK	WATCH/HELP-INT	READ/SILENT	HI MENT PROCESS	MEO	1	0.18	350	0.26
COOPERATIVE	DIV SEATWORK	WATCH/HELP-INT	VARIETY	FACT, KNOWLEOCE	MEO	1	0.18	216	0.16
COOPERATIVE	DIV SEATWORK	WATCH/HELP-INT	VARIETY	CONCEPTS, SKILLS	MEO	2	0.37	408	0.30
COOPERATIVE	TEST	NOT IN	TEST	FACT, KNOWLEOCE	HICH	1	0.18	8	0.01
COOPERATIVE	GROUP WORK	NOT IN	CRAFTS	NOT APPLICABLE	MEO	1	0.18	24	0.02
COOPERATIVE	CROUP WORK	NOT IN	REM-PLAY	APPLICATION	HICH	1	0.18	126	0.09
COOPERATIVE	CROUP WORK	NOT IN	READY/T	NOT APPLICABLE	NONE	1	0.18	35	0.03
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	SOLVE/OESK	CONCEPTS, SKILLS	HICH	1	0.18	28	0.02
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	SOLVE/OESK	APPLICATION	HICH	1	0.18	42	0.03
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	SOLVE/OESK	HI MENT PROCESS	HICH	6	1.10	432	0.32
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	OISC/LIS	CONCEPTS, SKILLS	HIGH	3	0.55	458	0.34
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	OISC/LIS	APPLICATION	MEO	5	0.92	635	0.39
COOPERATIVE	GROUP WORK	WATCH/HELP-INT	OISC/LIS	APPLICATION	HICH	6	1.10	480	0.36
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	OISC/LIS	HI MENT PROCESS	MEO	5	0.92	118	0.09
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	OISC/LIS	HI MENT PROCESS	HICH	9	1.65	807	0.59
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	WRITE	CONCEPTS, SKILLS	MEO	2	0.37	78	0.06
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	WRITE	APPLICATION	MEO	3	0.55	72	0.05
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	WRITE	APPLICATION	HICH	9	1.65	660	0.48
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	WRITE	HI MENT PROCESS	HICH	5	0.92	320	0.24
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	RESEARCH	CONCEPTS, SKILLS	MEO	4	0.73	206	0.15
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	RESEARCH	APPLICATION	MEO	1	0.18	24	0.02
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	RESEARCH	LOCATE INFO	MEO	9	1.65	655	0.48
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	RESEARCH	LOCATE INFO	HICH	5	0.92	456	0.33
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	RESEARCH	NOT APPLICABLE	MEO	1	0.18	54	0.04
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	ORAW/PAINT	FACT, KNOWLEOCE	MEO	1	0.18	210	0.15
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	ORAW/PAINT	CONCEPTS, SKILLS	MEO	2	0.37	352	0.26
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	ORAW/PAINT	LOCATE INFO	MED	2	0.37	360	0.26
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	ORAW/PAINT	NOT APPLICABLE	MED	[illegible]	[illegible]	2534	1.86
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	MAPS	SYMBOLIC	MED	1	0.18	44	0.03
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	MAPS	SYMBOLIC	HICH	2	0.37	243	0.18
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	CRAFTS	CONCEPTS, SKILLS	MEO	2	0.37	104	0.08
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	CRAFTS	NOT APPLICABLE	MEO	13	2.39	989	0.73
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	CRAFTS	NOT APPLICABLE	HICH	5	0.92	405	0.30
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	MANIP	APPLICATION	MEO	1	0.18	35	0.03
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	MANIP	APPLICATION	HICH	1	0.18	25	0.02

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US27	US23	US24	US25	US70	US31	NUMBER	PERCENT	SUMOCC	OCCPC
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	GAME-COC	APPLICATION	MED	19	3.49	678	0.50
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	GAME-COC	APPLICATION	HICH	8	1.47	532	0.39
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	GAME-COC	HI MENT PROCESS	HICH	8	1.47	748	0.55
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	REM-PLAY	APPLICATION	HICH	4	0.73	378	0.28
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	READY/T	FACT, KNOWLEOCE	HICH	1	0.18	35	0.03
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	VARIETY	CONCEPTS, SKILLS	MED	3	0.55	190	0.14
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	VARIETY	CONCEPTS, SKILLS	HICH	3	0.55	234	0.17
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	VARIETY	APPLICATION	HICH	6	1.10	557	0.41
COOPERATIVE	CROUP WORK	WATCH/HELP-INT	VARIETY	HI MENT PROCESS	HICH	1	0.18	145	0.11
COOPERATIVE	CROUP WORK	WATCH/HELP-CONT	MANIP	APPLICATION	MEO	1	0.18	42	0.03
COOPERATIVE	CROUP WORK	WATCH/HELP-CONT	REM-PLAY	CONCEPTS, SKILLS	HICH	1	0.18	76	0.06
COOPERATIVE	CROUP WORK	ACTION OIRECTOR	SOLVE/OESK	CONCEPTS, SKILLS	MEO	3	0.55	32	0.02
COOPERATIVE	STUOENT REPORTS	ACTION OIRECTOR	VARIETY	CONCEPTS, SKILLS	HICH	1	0.18	735	0.54
EXTERNAL	FILM/AV	NOT IN	FILM/AV	FACT, KNOWLEOCE	NONE	1	0.18	160	0.12
EXTERNAL	FILM/AV	WATCH/HELP-INT	FILM/AV	FACT, KNOWLEOCE	NONE	8	1.47	3309	2.43
EXTERNAL	FILM/AV	ACTION OIRECTOR	FILM/AV	FACT, KNOWLEOCE	NONE	14	2.57	5370	3.94